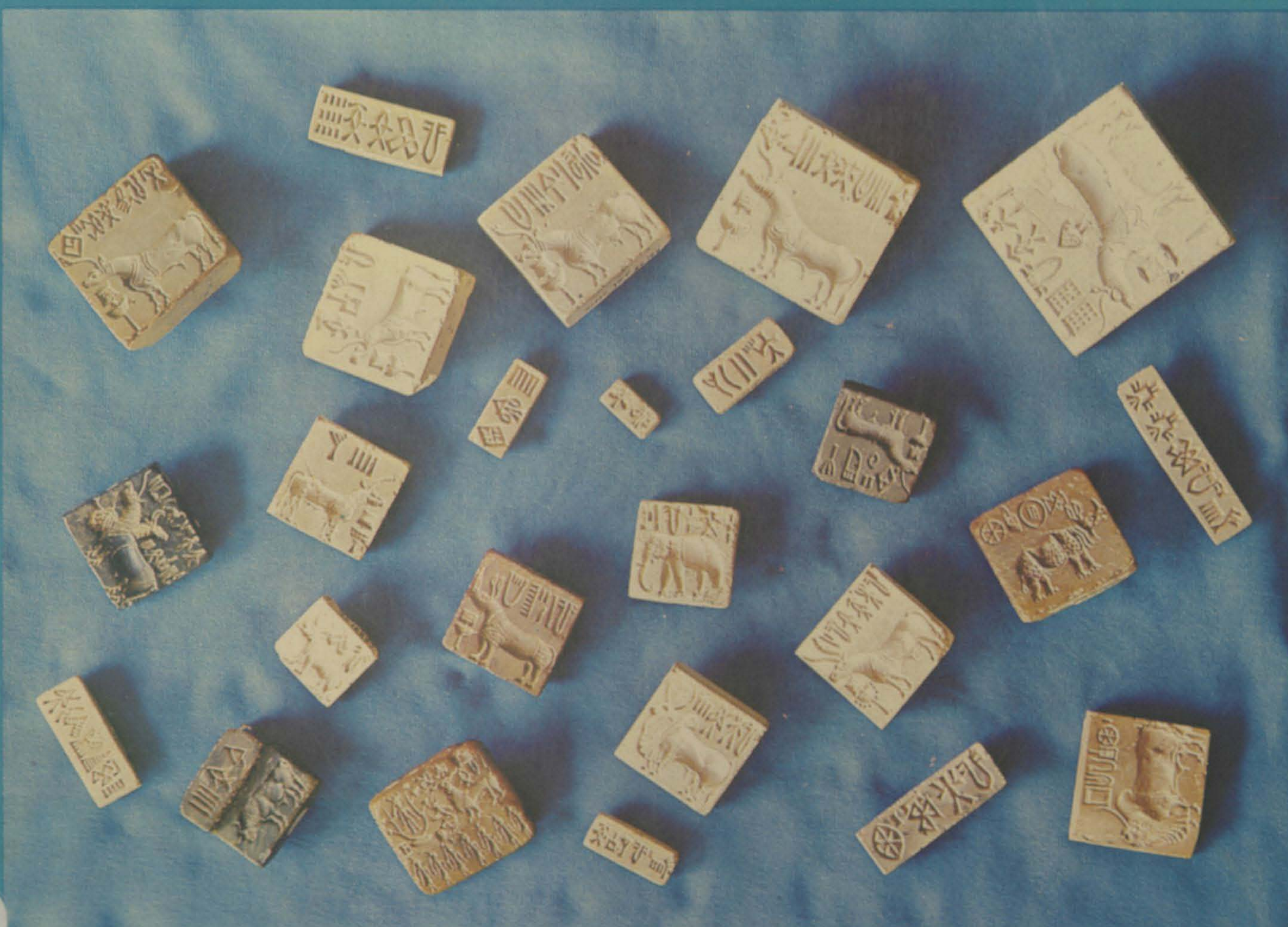
INTERNATIONAL SYMPOSIUM ON

MOENJODARO



Edited by

AHMED NABI KHAN

PROCEEDINGS OF INTERNATIONAL SYMPOSIUM ON MOENJODARO 1973

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Edited by

AHMAD NABI KHAN
Superintendent of Archaeology
(Excavations and Exploration)

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CONTENTS

Foreword

THE discovery of Moenjodaro, now universally acknowledged as one of the greatest metropolises of the most ancient East, more than fifty years ago, has revolutionized the history of the Subcontinent. It was therefore necessary to celebrate the fiftieth anniversary of this epoch-making discovery by organizing an International Symposium to review the state of research on various aspects of the Indus Valley Civilization and also to discuss ways and means for the preservation of its excavated remains, which are grievously threatened by the menace of waterlogging and salinity. The proceedings offer a resume of this very successful Symposium.

The year 1973, and the one preceding it, have been most important in the history of the preservation of Moenjodaro. In July last year, a fresh team of Unesco and Pakistani experts undertook the re-examination of the problem. The outcome of their deliberations was the preparation of a comprehensive Master Plan. On the basis of this Master Plan, the Unesco has set down definite proposals to assist us in the formidable task of saving these remains from decay. These proposals have been included in the Unesco's Plan for the protection of cultural property.

The International Symposium held under the joint auspices of the Government of Pakistan and the Unesco was a great success and unique in the history of Archaeology in Pakistan. This was initially due to the real impetus provided by the keen and untiring interest taken by our President over several years now, for saving this site. For three days the campus of this ancient city was turned into an International rendezvous where specialists, scholars and eminent personalities from well over 15 countries of the world met and worked, and in the end unanimously appealed to the world to take up the task of its preservation without loss of time in the following terms: "That the Director-General of Unesco be informed of the success of this widely attended Symposium, with the earnest and urgent hope that the Master Plan which the Symposium discussed and approved for the conservation of the site of Moenjodaro, as an

outstanding monument of mankind's earlier aspiration and advance towards a mature civilization, may be implemented as a project of high priority, worthy in every sense of the fullest international support. Moenjodaro is a memorial not merely of the State of Pakistan, which is now fully conscious of its responsibilities as its custodian, but is a visual document of the initial progress of humanity towards an evolved civilization. It is indeed today the property of mankind."

The success of this great occasion was entirely due to the pre-planning, untiring and zealous efforts of all the officers and staff of the Department of Archaeology, who worked with unflinching zeal under the inspiring guidance of its Director, Mr. S.A. Naqvi. For me, it was a pleasure, and a matter of personal satisfaction, to see various organized and disciplined teams working together with full devotion for the success of the Symposium. I am happy to record my appreciation for their work and to thank all of them most sincerely.

We are also grateful to the National Bank of Pakistan for agreeing to finance the construction of a 'Shopping Arcade' at Moenjodaro for tourists, which has been constructed by the Department of Archaeology; to the National Book Centre, who organized a Special Exhibition of Books printed in Pakistan; to the Mehran Arts Council, and specially its able Director and well-known scholar, Dr. N.A. Baloch, for organizing an illuminating and representative performance of folk songs of Sind; to the private donors who have desired to remain anonymous; and finally to the Ministry of Tourism and the Pakistan Tourism Development Corporation and their staff for their cheerful and whole-hearted support for making the International Symposium the success that it was.

Feroze Nana Ghulamally
CHAIRMAN

National Committee for the Preservation of Moenjodaro

CHAIRMAN: Mr. Justice Feroze Nana Ghulamally,
Former Judge of the High Court of West Pakistan

VICE-CHAIRMAN: Mr. Q. U. Shahab,
Secretary to the Government of Pakistan,
Ministry of Education.

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7) Mr. Mahboob Hasan,
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8) Mr. S. A. Aryne,
   Director,
   Project Planning Division,
   Water & Power Development Authority, Pakistan.
9) Mr. Muhammad Waliullah Khan,
   Director of Conservation, Auqaf Department,
   Government of the Punjab, Lahore.

SECRETARY: Mr. S. A. Naqvi,
Director of Archaeology and Museums,
Government of Pakistan.


SYMPOSIUM
SARY OF
XCAVATION

Inaugural Address

by

Mr. Zulfikar Ali Bhutto

PRESIDENT OF PAKISTAN

Your Imperial Highness, Excellencies,
Ladies & Gentlemen,

I am happy to welcome you to this International Symposium on Moenjodaro which has been organized in collaboration with Unesco to mark the Fiftieth Anniversary of the archaeological excavations of the site. This place where you are assembled today enshrines a unique piece of history. Moenjodaro is a very important land-mark in the panorama of the evolution of human civilization. It portrays with remarkable vividness the life of man as it was lived about five thousand years ago.

Whatever their physical location, monuments of such historical significance are in fact the common cultural heritage of the entire mankind. It was, therefore, highly appropriate for Unesco to revive its interest in the preservation of Moenjodaro. Concrete steps are contemplated now to save this site of universal human importance through international help and co-operation. The present state of excavated remains at Moenjodaro has already attracted world attention. By adopting a resolution in its last General Conference, Unesco has indeed highlighted the urgent need for its preservation. On our part, we are firmly determined to save this ancient site. For us, it is not only a relic of our own past but also one of those embodiments of human cultures which must be preserved to enrich the reservoirs of man's knowledge and culture. The limitations of a developing country like Pakistan in meeting the technological and material requirements of the maintenance of a site like Moenjodaro which is faced with the twin menace of waterlogging and salinity are obvious. But I feel confident that, under the auspices of Unesco, the nations of the world will not hesitate to meet the challenge of a situation where the skill and resources of man have got to rescue and preserve what 5,000 years of time and oblivion have failed to destroy. The response of the international community to the Unesco call for saving Abu Simbel in Egypt, Venice in Italy and Borobudur in Indonesia is indeed a source of great hope and encouragement to us.

In retrospect, Moenjodaro is one of the earliest spots which witnessed the germination of the seeds of human civilization and urbanity. In prospect, it offers a creative channel for international co-operation. We in Pakistan shall look upon this International Symposium on Moenjodaro as the beginning of a new era of understanding and assistance among the nations of the world in a cause dedicated to the preservation of a cultural heritage which is of equal value to all of them. The remains of Moenjodaro signify the importance of human talent in collective well-being and its triumph over the destructive phenomena of time and nature. The international endeavour to save the site from the dangers of waterlogging and salinity will no doubt become by itself a monument to the spirit of goodwill and co-operation displayed by the man of today in the cause of protecting the richness of human history and civilization.

I have great pleasure in inaugurating the International Symposium on Moenjodaro on the occasion of the 50th Anniversary of the excavations of the site and wish its deliberations all success.

MESSAGE

from

Mr. Rene Maheu

Director-General, Unesco

MOENJODARO, whose discovery some fifty years ago this Symposium is commemorating, is of the greatest historical and cultural interest, not only to Pakistan but to all mankind. Excavations at the vast site of this ancient city have brought to light a regular pattern of streets, hydraulic developments, storage facilities for grain and other amenities indicative of a level of municipal development and town-planning reached nowhere else in the world until many centuries later. It is their obvious concern for the well-being of all its citizens that gives Moenjodaro its peculiar and fascinating attraction: a concern which is in marked contrast to the vast differences in other civilizations contemporary with Moenjodaro between the provisions made for the privileged few—the priest-kings and the aristocracy—and the mass of the population.

The site has unfortunately deteriorated since excavations began. The construction of a barrage on the Indus River and the introduction of intensive agriculture have raised the level of the underground water-table, a phenomenon all too common when agriculture is developed in semi-arid areas. Fields in such areas become filled with salts, and in the Indus Valley much formerly fertile land has had to be abandoned.

This ancient city, the creation of a people whose pragmatic and artistic genius at an early moment in the history of mankind has been revealed so startlingly by archaeology, must be carefully preserved. The decision of the Government of Pakistan to build tubewells to lower the water-table, not only to benefit the archaeological site of Moenjodaro, but also to improve agricultural productivity, is therefore timely. It is also a solution which, combining the practical with the cultural, would undoubtedly have pleased the ancient inhabitants of the city.

Moenjodaro is now included amongst the major sites and monuments—Philae, Venice, Borobudur—for whose preservation Unesco is seeking voluntary contributions from the international community. If we all work together, we shall save Moenjodaro.

ADDRESS

by

H. I. H. Prince Takahito Mikasa of Japan

I WISH to express, on behalf of the distinguished foreign participants to the Symposium and on my own behalf, the most sincere thanks to the Government of Pakistan for making our stay in Pakistan pleasant and informative. We are honoured and very much pleased to have an opportunity to meet the President of Pakistan, His Excellency Mr. Zulfikar Ali Bhutto.

May I be permitted to tell you about my own impressions? When I received the invitation from the Government of Pakistan last year, my heart was filled with joy. As a student of the ancient history of the Middle East, I never forget the name of Moenjodaro, the most ancient and most elaborately planned and constructed city in this world, which has reminded Sir Mortimer Wheeler of New York's Broadway Street. After going around the sites of the city, I realized how poor and how superficial was the knowledge obtained from books and photographs. Each block of bricks, rectangular or triangular, laid vertically or horizontally, the wonderful system of drainage in straight or loosely curved lines made a vivid impression on me. The dyer's shop and the metal-worker's shop remind the daily life of the artisans of Moenjodaro.

This International Symposium has been a most important and useful one. We, the participants, recognize, once again, the importance of the preservation of Moenjodaro. This is, indeed, the most precious heritage of all mankind, and we do wish that it should be saved by all possible means, so that we may be able to pass it on to the next generation. I consider it the duty of all the participants in the Symposium to communicate to their own people what they have seen and discussed at Moenjodaro. It will help to mobilize world public opinion in order to preserve the relics of the great and most valuable Indus Valley Civilization.

The Government of Pakistan and Unesco have already done a great job to save this ancient culture. We, the participants, will do our best to co-operate with the Government of Pakistan and Unesco in the noble task of preserving this universal human heritage.

ADDRESS

by

Mr. Abdul Hafeez Pirzada

Minister for Education and Provincial Co-ordination
Government of Pakistan

Mr. President,
Your Imperial Highness Prince Mikasa,
Excellencies, Ladies and Gentlemen,

The International Symposium being held today amidst the remains of this pre-historic city of Moenjodaro has a serious purpose. Besides evaluating the present state of research on this early phase of human history, it is also going to sound a note of warning to the world at large that these remains stand doomed to effacement by the scourge of salinity and water-logging, and if nothing is done to redeem the situation, Moenjodaro will be no more in a couple of decades from now.

Moenjodaro, as we all know, is one of the most striking monuments of the dawn of civilization. Large-scale excavations conducted at the site, have revealed an amazing story of the customs, arts and crafts, social system and economic life of the people who inhabited this city about 5,000 years ago. The pictographic script, and a large number of other relics unearthed there, take us out of the conventional abstractions of pre-history and tell us the story of the man who was the architect of a highly developed society at a time when most of the civilized world of today was still groping for its way to progress. The need for the preservation of this unique heritage of mankind can therefore be hardly overemphasized.

The menace of salt encrustations on the structural remains of Moenjodaro has been tackled with constant vigilance by our Department of Archaeology, but only with limited success. Chemical treatment of the brick-work and mud-capping techniques have minimized the harm to these structural relics to a certain extent; but these methods remain mere palliatives of short-term effect. In the learned opinion of experts, the only satisfactory cure of the malady lies in lowering the table of the subsoil water to a depth which would prevent the saline exudation by capillary movement.

Simple as it may sound, the question of lowering the water-table beneath the entire area of Moenjodaro involves immense problems, which I will leave to the experts to discuss. Coupled with the menace of the rising water-table is the less persistent but more erratic behaviour of the River Indus in the vicinity of this ancient city. It threatens to wash it away in one of those mighty sweeps of the disasterous floods that are common in this monsoon land. This is a veritable nightmare to the custodians of this cultural legacy of mankind, and needs serious attention to find a permanent safeguard. I am glad that Unesco, in keeping with its noble Charter, has taken note of the situation and has come forward to the rescue of Moenjodaro. A Master Plan has since been prepared jointly by the experts of Unesco and Pakistan, and the project has been approved by the General Conference of Unesco this year. We are confident that the international community will respond generously to the Unesco appeal and make it possible to implement the Master Plan for the preservation of Moenjodaro successfully and without delay.

Mr. President, today when we are hopefully looking forward to the proper preservation of this ancient site, I cannot but recall that about

ten years ago you were the first to realize the gravity of the situation faced by Moenjodaro and carried out ceaseless efforts to focus both national and international attention on the paramount need for its preservation. It was at your instance, as Foreign Minister of the country at that time, that Unesco was approached and the studies of the problem were started. We are happy indeed that you are present with us today as the President of Pakistan on an occasion which marks the first concrete step in international co-operation to save this ancient city. We owe you a deep debt of gratitude for your keen personal interest, not only in the preservation of Moenjodaro, but also in the development of cultural activities in the country as a whole.

I am also thankful to Mr. Rene Maheu, Director-General of Unesco, for his keen interest in the project of Moenjodaro and for his co-operation in organizing this International Symposium. Our sincere thanks are also due to our distinguished guests, who have come all the way to this distant place to participate in a seminar which will no doubt be a guiding light in the implementation of our plans for the preservation of Moenjodaro. I hope that our guests from abroad will enjoy their stay in Pakistan and forgive us for any inconvenience caused inadvertently during their sojourn at Moenjodaro, Lahore, Islamabad and Peshawar.

I would also like to put on record my appreciation for the services rendered by the Chairman and members of the National Committee for the Preservation of Moenjodaro, the Director of Archaeology and Museums and his colleagues in the Department, who have worked hard in connection with the arrangements of this Symposium. My thanks are also due to the Managing Director, National Bank of Pakistan, who extended his helping hand to put up a Tourist Shopping Centre at Moenjodaro at considerable cost.

With these words, Ladies and Gentlemen, I thank you for your presence on this auspicious occasion and request the President of Pakistan to inaugurate the International Symposium on Moenjodaro.



Foreign delegates attending the Inaugural Session.

Address of Welcome

by

Mr. Q. U. Shahab

Secretary, Ministry of Education

Mr. President,
Your Imperial Highness Prince Mikasa,
Mr. Bolla, Excellencies,
Ladies and Gentlemen,

In the absence of Mr. Justice Feroze Nana, Chairman of the National Committee for the Preservation of Moenjodaro, who is unable to be with us on account of his unfortunate indisposition, it is my privilege to welcome you to this inaugural session of the International Symposium on Moenjodaro organized with the co-operation of Unesco on the Fiftieth Anniversary of the excavations of this world-famous site.

Ever since the discovery of Moenjodaro, large-scale excavations were conducted under Sir John Marshall, and by the year 1930, a remarkable civilization which flourished in the Indus Valley about five thousand years ago had been unearthed. The origin of this civilization, however, remains obscure, in spite of the determined efforts of an archaeologist of the eminence of Sir Mortimer Wheeler, who is present amongst us today. It was in 1950 that Sir Mortimer tried to reach the lowermost occupational levels, in the face of subsoil water oozing from the trenches. It was, however, found that the level of the ground water had risen 15 feet above that of 1923, hindering not only further excavation but also bringing in its wake the scourge of salinity and waterlogging.

The strategy of the 'Save Moenjodaro' project demands action on three fronts—namely, lowering the water-table, preventing bank erosion by the River Indus, and conservation of structural remains. The Master Plan prepared by Unesco consultants in close cooperation with our own experts is designed to meet this three-fold challenge, and it is hoped that the Symposium that commences today will pave the way for a smooth implementation of the programme contemplated by the Master Plan.

The importance of Moenjodaro and the need for its preservation have been attracting the notice of experts from time to time; but it was only in November, 1972, that Unesco formally recognized it as one of the five world projects deserving urgent international attention and assistance. For this, our thanks are due to Mr. Rene Maheu, Director-General of Unesco, who as a man of wide understanding and culture has played a key role in putting Moenjodaro in the class of monuments which are now formally recognized as the common cultural heritage of all mankind.

It is also through the courtesy and good offices of Unesco that it has been made possible for us to hold the International Symposium on Moenjodaro that is being inaugurated this morning. This Symposium has provided us an opportunity of welcoming a galaxy of highly distinguished and eminent guests to Pakistan. We are grateful to His Imperial Highness Prince Takahito Mikasa, Right Honourable Miss Louise Gore, His Excellency Professor Tikhvinsky, His Excellency Dr. Mehmet Onder, Sir Mortimer Wheeler, Mr. Bolla, and to all other distinguished guests who have responded to our invitation and travelled all the way to this fascinating site to participate in the deliberations of the Symposium. On behalf of the National Committee for the Preservation

of Moenjodaro, I also warmly welcome the eminent Pakistani scholars and experts who are in our midst today to make their valuable contribution to the proceedings of the Seminar. Credit for the arrangements of the Symposium on this remote spot goes to the untiring efforts and organizational capability of the Director of Archaeology and Museums, the Deputy Commissioner of Larkana and their industrious colleagues. The National Bank of Pakistan has added to the amenities of this Archaeological Camp by putting up a handsome building which houses, not only a Branch of the Bank, but also the Tourist Welcome Service of the Ministry of Tourism, a Telegraph Office and a Gift Shop. The National Book Centre has brought a small Book Exhibition here in celebration of the International Book Year proclaimed by the Unesco. This modest Camp is the result of the co-operative endeavours of the Pakistan Tourism Development Corporation, Pakistan International Airlines, the Telegraph and Telephone Department, the Post Office Department, the Water and Power Development Authority and the Provincial Government of Sind—to all of whom we extend our heartfelt thanks.

Mr. President, Sir, we are, above all, grateful to you that in spite of your pressing preoccupations with affairs of State, you have graciously made a special trip to Moenjodaro to inaugurate this International Symposium. Not only as the Head of the State, but also as a man of education, culture and enlightenment, your patronage of the Save Moenjodaro Project will give this programme the national status and international prestige which it so richly deserves. We are most grateful to you, Sir, for doing us the honour of consenting to come here to inaugurate this International Symposium.



Highly decayed brick-structures at Moenjodaro.



First Session of the Symposium.


H.I.H. Prince Mikasa and other foreign and Pakistani delegates.

Summary of the Proceedings

by

Ahmad Nabi Khan

The International Symposium on Moenjodaro to mark the Fiftieth Anniversary of its discovery was inaugurated by the President of Pakistan, Mr. Zulfikar Ali Bhutto on Friday, 23rd February 1973, in an impressive ceremony held at the foot of the great stupa mound of Moenjodaro. The ceremony was attended by Begum Liaquat Ali Khan, Governor of Sind, Mr. Mumtaz Ali Bhutto, Chief Minister of Sind, Mr. Abdul Hafeez Pirzada, Central Minister for Education and Culture, and several other Central and Provincial Ministers, besides foreign and local delegates to the Symposium, foreign diplomats, members of the National Committee for the Preservation of Moenjodaro, high officials, and a select gathering of people from all walks of life. The inauguration commenced with a recitation from the Qur'an.

The welcome address was delivered by Mr. Q. U. Shahab, Vice-Chairman of the National Committee for the Preservation of Moenjodaro, and Secretary to the Government of Pakistan, Ministry of Education, in the absence of Mr. Justice Feroze Nana Ghulamally, Chairman of the National Committee for the Preservation of Moenjodaro, who could not attend the ceremony owing to his indisposition. Mr. Shahab, while welcoming the guests, stressed the significance of Moenjodaro and the gravity of the problem of its preservation. He said, "The strategy of the 'Save Moenjodaro Project' demands our engagement on three fronts, namely, lowering the water-table, preventing land erosion by the River Indus, and conservation of structural remains". He hoped that the Master Plan prepared by Unesco and Pakistani experts would meet the three-pronged challenge, and that its implementation would lead to a permanent solution of the problem of preserving these relics of the past. Mr. Shahab thanked Unesco, and especailly its Director-General, Mr. Rene Maheu, for their keen interest and active help in mobilizing international support for the preservation of these ancient remains, and for their assistance in organizing the International Symposium. "These steps," he said, "have played a key role in putting Moenjodaro in the class of monuments which are now finally recognized as the common cultural heritage of all mankind".

Mr. G. Bolla, Director, Department for the Preservation of Cultural Property, Unesco, who attended the Symposium as the representative of the Director-General of Unesco, then read out a message of Mr. Rene Maheu. The message while recognizing the need for the preservation of Moenjodaro, said that these remains represented one of the greatest manifestations of the historical and cultural achievement of ancient man, who belonged not only to Pakistan, but also to the entire world. It is due to this importance that Unesco has included Moenjodaro amongst the major sites and monuments—Philae, Venice, Borobudur—for whose preservation Unesco is seeking voluntary contributions from the international community. Concluding the message, the Director-General expressed his confidence that "If we all work together, we shall save Moenjodaro".

Mr. Abdul Hafeez Pirzada, Minister for Education and Culture, Government of Pakistan, then read his address and pointed out the significance of Moenjodaro, the magnitude of the task of its preservation and the role of Unesco's assistance in the implementation of this highly complicated undertaking. He expressed his satisfaction over Unesco's keen interest to assist Pakistan in saving these remains from further decay.

The President of Pakistan, Mr. Zulfikar Ali Bhutto, then addressed the distinguished gathering. He said, "Whatever their physical location, monuments of such historical significance are in fact the common cultural heritage of the entire mankind. It was therefore most appropriate for Unesco to revive its interest in the preservation of Moenjodaro. Concrete steps are contemplated now to save this site of universal importance through international help and co-operation. By adopting a resolution in its last General Conference, Unesco has indeed highlighted the urgent need for its preservation". He said that Pakistan would do its best to ensure the preservation of this heritage in spite of her limited resources: "On our part, we are firmly determined to save this ancient site. For us, it is not only a relic of our own past, but also one of those embodiments of human culture which must be preserved to enrich the reservoirs of man's knowledge and culture." In the end, he said: "We in Pakistan shall look upon this International Symposium on Moenjodaro as the beginning of a new era of understanding and assistance among the nations of the world in a cause dedicated to the preservation of a cultural heritage which is of equal value to all of them."

After the inauguration ceremony, the delegates and other guests were shown round the Archaeological Museum of Moenjodaro, where are displayed selected antiquities excavated from time to time from the site of Moenjodaro. Another feature of the visit was a special Exhibition of Books Printed in Pakistan, arranged by the National Book Centre as a part of the celebration of the International Book Year sponsored by Unesco. In the afternoon, the delegates visited the excavated remains, and in the evening they witnessed a special performance of Sindhi folk music organized by the Mehran Arts Council.

The first session of the Conference started in the morning on 24th February 1973, under the chairmanship of Sir Mortimer Wheeler. The theme of the session was the present state of research on the Indus Valley Civilization. For this purpose, a Pilot Paper had been prepared by Dr. M. R. Mughal, Assistant Superintendent in the Department of Archaeology. While introducing the Paper, the Chairman of the Session said, "I do not take it for granted that you stayed up the whole night reading this little yellow book. I am sure, however, you would like to devote this morning to discuss some points raised in it. I am going to invite the writer of this book, to read the more important passages from it, which we may discuss later on". Dr. Mughal then read out various sections of the Paper dealing with the distribution of the sites of the Indus Valley, the history of their survey and discovery since 1922, the question of the origin of the Civilization, its terminology and dating, its connection with other contemporary civilizations and, finally, its decline and downfall. After every section, a useful discussion ensued. On this occasion Mr. S. A. Naqvi informed the delegates that the Department of Archaeology had recently prepared a comprehensive programme to survey the entire archaeological wealth of Pakistan. The work on this project had been started by three teams of departmental officers last year, and had already yielded important information. In this respect, Sir Mortimer Wheeler also wished that there might be close collaboration with Indian archaeologists who were working on similar problems. Mr. Naqvi observed that it was not only India with whom such collaboration might be desirable; closer and more effective collaboration was also essential with Iran, as a recent survey in northern Baluchistan has indicated that the roots go deeper into the areas which are now part of Iran. Dr. Bagherzade (Iran) supported this suggestion, and informed the delegates of his discussions with Mr. Naqvi on the question of closer co-operation and collaboration between the Irani and Pakistani archaeologists.

The second session began in the afternoon of the same day, and discussion on the Pilot Paper continued. Thereafter, Dr. F. A. Khan, formerly Director of Archaeology and Museums, read his paper on *The Indus Valley Civilization and its Contemporary Cultures.* At the end, Mr. Naqvi announced that, due to limited time, it would not be possible for other scholars to read their papers, but that they might be treated as read. These papers included the following:

1) *The Indus Valley Script: A Survey of Attempts for its Decipherment,* by Ahmad Nabi Khan.

2) *The Indus Valley Script on Punch-marked Coins,* by Taswir Husain Hamidi.

3) *A Few Harappan Sites Explored Recently,* by N. A. Baloch.

4) *Burial Practices Among the People of the Indus Valley Civilization,* by Sh. Khurshid Hasan.

5) *Leaching Experiments to Eliminate Salt-Effects at Moenjodaro,* by Ch. Rehmatullah.

6) *Kot Diji and Moenjodaro,* by M. A. Halim.

7) *Architecture of Moenjodaro,* by Niaz Rasool.

8) *Jewellery from Moenjodaro,* by Masood-ul-Hasan.

9) *The Barter System Among the Indus Valley People,* by P. T. Nasir.

Mr. Ahmad Nabi Khan, the Rapporteur of the Symposium, assured the writers that their papers would be published in the *Proceedings.*

The session ended with a Vote of thanks to the Chairman.

The third session of the Symposium which was held in the morning on 25th February 1973, under the chairmanship of Mr. Mumtaz Hasan, dealt with the Master Plan for the preservation of Moenjodaro. To begin with, the four principal aspects of the problem were explained and discussed by the Pakistani experts who had prepared the various chapters of the Plan. Mr. S. A. Naqvi introduced the subject by outlining the importance of the archaeological remains at Moenjodaro, the causes and effects of their deterioration, and the ways and means of their preservation. He expressed concern over the alarming pace of deterioration the ruins were facing by quoting from a report of Dr. H. J. Plenderleith, who said, "If nothing is done to preserve them, all the existing excavations will crumble within the next twenty to thirty years and one of the most striking monuments of the dawn of civilization will be lost for ever". Mr. Naqvi dealt briefly with the history of the efforts made by the Government of Pakistan to check the menace, as well as the recommendations of various technical Missions sent by Unesco from time to time. The first Mission, he said, visited Pakistan in 1961 and made recommendations on the preservation of the cultural heritage of Pakistan as a whole. Dr. A. E. Werner, while appreciating measures adopted by the Department of Archaeology, then suggested that research might also be carried out on various other scientific methods. In 1965, a broad-based Unesco Mission came to Pakistan to study the problem of preserving the ancient remains. The Mission, headed by Dr. H. J. Plenderleith, Director of the Rome International Centre for the Preservation of Cultural Property, studied the deterioration of structural remains on the spot and suggested certain preservative measures. Since then, several foreign Missions had been coming and offering their recommendations. However, it was not until 1972, when a team of Pakistani and Unesco experts met and, after considering the various recommendations of previous Missions prepared



Second Session of the Symposium.

a final Master Plan which was now being presented. The Master Plan includes four aspects of the preservation and presentation of Moenjodaro: (i) *Ground-water Control*, prepared by S. A. Aryne and Masood H. Khan of the Water and Power Development Authority of Pakistan, 'Document No. 9/4/72-Arch (1)'; (ii) *Protection Against River Erosion*. prepared by Chowdhri Mohammad Ali of the Irrigation Research Institute, Lahore, 'Document No. 9/4/72-Arch-(2)' (iii) *Conservation of Structural Remains*, prepared by the Department of Archaeology, 'Document No. 9/4/72-Arch(3)'; and (iv) *Promotion of Cultural Tourism*. prepared by the Department of Tourism, 'Document No. 7/4/72-Arch(4)'. The documents had been prepared after extensive and careful research and scientific experimentation, and included comprehensive measures to be adopted for the protection of these archaeological remains.

After this general introduction, Mr. S. A. Aryne presented his paper to explain the salient features of the scheme for ground-water control. He said that the project had been devised to construct a ring of tubewells on the periphery of the exposed ruins. The scheme had been divided into three stages to preserve the monuments and to enable archaeologists to excavate deeper levels. The effluence from the tubewells could either be discharged into Dadu Canal, where it would make a useful contribution to the irrigation, or alternatively used for a small selected area which could be developed to a high intensity agriculture. The first four wells drilled in the area could be used for hydrologic or geologic investigation of the acquifer as well. The plan was based on interpolated values of constants. It was, therefore, important that these paremeters are confined before the project was fully implemented. After the first phase tubewells had been installed, one of the most important activities of their operation would be the monitoring of well outputs, observing the effects of lowering the water-table on soils and the monuments, and noting the variations and influence of other factors. The plan envisaged lowering the water-table in three stages. In the first stage, a ring of 14 wells were to be installed to lower the water-table to 20 feet below ground-level; and they would operate at 71 per cent of the annual operation factor. In the second stage, 12 additional wells were to be installed in the same circle to lower the water-table to 32 feet below ground-level, and in this phase, the wells would operate at 74 per cent of the operation factor. Eventually, in the third stage another 30 tube-wells were to be installed in a second ring, 800 feet away from the first. The water-table could then be maintained at 65 feet below ground-level by operating all 56 wells at 74 per cent of the annual operation factor.

After these presentations, a lively discussion ensued on various aspects of the execution of the scheme, in which Dr. F.A. Khan, Mr. Aryne, Mr. Waliullah Khan, Mr. S.A. Naqvi, Mr. Beaufort, and Sir Mortimer Wheeler participated. Mr. Beaufort spoke at length on the scheme, and advocated patience and due care in the execution of the work. Regarding the three proposed stages, he agreed that stage one was of the utmost importance and urgency. If it was not carried out, Moenjodaro would be lost for ever within a period of twenty to thirty years. "We have," he said, "seen the site at a wrong moment. When I last came here in winter, I found everything white, the walls were white, the floor was white, pure white. I wish you could have seen that phenomenon to realize the extent of the danger. I would therefore like to stress very strongly that stage one must be executed without delay. Stage two would be a valuable addition to stage one; and stage three, I should say, will need further detailed study. This work will not take one or two years; it may take 10 years." At this stage, Mr. Naqvi pointed out that "everybody among us agrees that stage one of the Plan must

be executed. About the second and third stages, however, some have observed that they would be an archaeological luxury. This notion must be dispelled, as it is certainly not a luxury. We are not preserving Moenjodaro as a luxury of archaeology; we are preserving it because it is the heritage of mankind. It is a monument which must be preserved. I quite agree with Mr. Beaufort that we must have patience while executing this complicated task. But the Master Plan has to be considered and approved by the Executive Board of Unesco as a whole and put forward for international assistance. It should make provision for the execution of entire Plan. If Unesco or its Executive Board approves the Plan only up to stage one or stage two, it would not be a Master Plan. I would, therefore, earnestly request all the delegates and the members of Unesco present here to consider and approve the Master Plan as a whole, so far as the lowering of the water-table is concerned."

The second scheme, dealing with the control of the river course, and was presented by Mr. S. A. Rashid, who after outlining the background of the changes which the River Indus has gone through during the past few decades, proposed that the training of the river course should be on a permanent footing, for which purpose, a hockey-cum-T-cum-sloping spur would be the most suitable measure, as it would avoid any outflanking of a guide bank. It would also minimise the chances of an attack of flow towards the back of the guide-bank head. The guide-bank proposed for protecting the excavated remains would be 4000 feet in length, diverging outward gradually. The back of the guide-bank at head and tail would be stone-armoured to a length of 600 feet for reinforcement. The system would train the river Indus on a permanent basis.

Mr. Waliullah Khan, Project Director, Auqaf Department of the Government of the Punjab, then spoke on salient features of the scheme for the conservation of structural remains. To begin with, he gave a brief resume of previous attempts designed and executed by the Department of Archaeology, which had so far succeeded in keeping the structures intact to a considerable extent. He, however, added that these measures had been more or less in the nature of first aid remedies. On the other hand, these very measures adopted on a more elaborate scale, along with the measures approved for lowering the water-table and training the course of the Indus, would give more satisfactory and permanent results. "The scheme for the conservation of structural remains", he said, "includes, first of all, the removal of the debris lying close to the excavated remains. As we all know, this debris is contaminated with salts, and after every rain or wind-storm these salts enter into the excavated structures through water or wind, thus damaging them. This accumulated earth is to be removed immediately in order to clean the area. Secondly, mud or mud-brick capping was to be provided for all the exposed structures. The advantage of this measure has been that it saves the structures from deterioration, since the surface of the bricks is coated with a thin slurry of mud. There has, however, been some objection to this measure, since, according to some people, it spoils the bright red colour of the bricks. But it must also be borne in mind that, as evidence has shown us, these structures did have a mud plaster originally". Thirdly, removal of the salt-affected earth from within the excavated remains should be followed up by providing a layer of pure sand and clay. This measure would check further eruption of salts from within the remains, which ate up the bare foundations of the structures. Fourthly, a damp-proof course should be laid in cement concrete (1: 1 : 3) in the form of 3-inch thick pre-cast slabs, after making incisions into the masonry for the purpose and coat of bitumen should be applied under pressure. Fifthly, arrangements should be made for underpinning the decayed and undermined bricks in the structures with

newly manufactured bricks, of the same size as the original bricks, laid in mud morter. Sixthly, *pushtas* of sweet earth should be provided at the base of overhanging walls. "These are", he said, "some of the important measures of archaeological conservation to be undertaken to preserve the ancient remains. Some of them are, of course, of a temporary nature, which may have to be abandoned when other schemes are finally implemented."

The Chairman then invited Dr. Zaky Iskander, Director-General, Antiquities Organization, Cairo, and a Unesco expert, to read his paper on the *Preservation and Presentation of the Archaeological Site of Moenjodaro after Desalinization.* This paper was actually the report he had sent to Unesco; and it suggested initial measures to be taken after the desalinization of the brick structures.

The third session came to an end with an expression of thanks from the Chairman. He said: "It is my pleasant duty as well as proud privilege to render thanks. In the first place, we would like to express our gratitude to the President of Pakistan, Mr. Zulfikar Ali Bhutto, for the personal interest he has taken in the preservation of this great monument. We are also grateful to Mr. Abdul Hafeez Pirzada, Central Minister for Education and Provincial Co-ordination, and Mr. Mumtaz Ali Bhutto, Chief Minister of Sind, for their keen and personal interest. We are very happy to have with us members of the Executive Board of Unesco, who found the time to come all the way to this prehistoric city to see for themselves the over-all picture, and to take part in these proceedings. We are very grateful for the presence, among us, of His Imperial Highness Prince Takahito Mikasa, whose abiding interest in the archaeology of the East prompted him to visit Pakistan and to see Moenjodaro on this occasion. We are happy to welcome other distinguished and world-renowned archaeologists and historians, like Sir Mortimer Wheeler, H. E. Prof. Serguefl Tikhvinsky, H. E. Dr. Mehmet Onder, Prof. Van Lohuizon de-Leeuw, Dr. Firuz Bagherzadeh, and other distinguished delegates from abroad and from Pakistan who took the trouble to come here and help us by participating in the deliberations of the International Symposium. We are also grateful to the Symposium Committee, particularly its Chairman, Mr. Justice Feroze Nana Ghulamally, for their personal interest in organizing the Symposium and lastly, a word about the extraordinary devotion and enthusiasm of the officials of the Department of Archaeology, who undertook the organization of the symposium under the able and inspiring guidance of its Director, Mr. S. A. Naqvi. The enormous work which included the construction of the huge buildings, renovation and re-organization of the old rest houses, the museums and the excavated site—besides the actual work of organizing the Symposium—was carried out by these enthusiastic and devoted officials in addition to their normal official duties.We greatly appreciate their efforts."

At the close of the Symposium, the delegates unanimously passed a resolution in the shape of an appeal to be made to Unesco's Director-General. The following is the text of the Resolution.

> "That the Director-General of Unesco be informed of the success of this widely attended Symposium, with the earnest and urgent hope that the Master Plan which the Symposium discussed and approved for the conservation of the site of Moenjodaro, as an outstanding monument of mankind's earlier aspiration and advance towards a mature civilization, may be implemented as a project of high priority, worthy in every sense of the fullest international support. Moenjodaro is a memorial not merely of the State of Pakistan, which is now fully conscious

of its responsibilities as its custodian, but is a visual document of the initial progress of humanity towards an evolved civilization. It is indeed today the property of mankind."

In the afternoon, the foreign delegates left Moenjodaro for Lahore by a special PIA flight. During their brief stay at Lahore, they visited the Lahore Museum, the Shalimar Gardens, the Badshahi Mosque and the Lahore Fort. Next day, in the afternoon, they left for Islamabad to attend a formal meeting with the Central Minister for Education and Provincial Co-ordination. During the meeting, the delegates expressed their satisfaction and appreciation for the arrangements made by the Government of Pakistan for their visit, and for providing them with an opportunity to see for themselves the great monuments of Moenjodaro. They promised to help Pakistan in the task of the preservation of Moenjodaro. Similar sentiments were expressed by His Imperial Highness Prince Takahito Mikasa while replying on behalf of the foreign delegates to a luncheon speech of the Minister for Education and Provincial Coordination on 27th February 1973. He said:

"I wish to express on behalf of the distinguished foreign participants to the symposium and on my own behalf the most sincere thanks to the Government of Pakistan for making our stay in Pakistan pleasant and informative. We are honoured and very much pleased to have had an opportunity to meet the President of Pakistan, His Excellency Mr. Zulfikar Ali Bhutto. May I be permitted to tell you my own impressions. When I received the invitation from the Government of Pakistan last year, my heart was filled with joy. As a student of the ancient history of the Middle East, I never forget the name of Moenjodaro, the most ancient and most elaborately planned and constructed city in this world which had reminded Sir Mortimer Wheeler of New York's Broadway Street. After going around the sites of the city, I realized how poor and how superficial was the knowledge obtained from books and photographs. Now, each block of bricks, rectangular or triangular, laid vertically or horizontally, the wonderful system of drainage in straight lines or loosely curved, have all struck my heart very vividly. The dyer's shop and the metal worker's shop reminded me of the daily life of the artisans of the Moenjodaro of those days. This International Symposium was a most important and useful one. We, the participants, recognize once again the importance of the preservation of Moenjodaro. This is, indeed, a most precious heritage of all mankind, and we wish that it should be saved by all possible means, so that we may be able to pass it on to the next generation. I consider it the duty of all the participants in the Symposium to communicate to their own people what they have seen and discussed in Moenjodaro. This will help to mobilize world public opinion in order to preserve the relics of this great and most valuable Indus Valley Civilization. The Government of Pakistan and Unesco have already done a great job towards saving this ancient culture. We, the participants, will do our best to co-operate with the Government of Pakistan and Unesco in the noble task of preserving this universal human heritage."

On 28th February 1973, the delegates visited Peshawar, from where they went to see the historic Khyber Pass; and on their return in the afternoon, they paid a visit to the Peshawar Museum. The same evening they returned to Karachi, and the next day, on 1st March 1973, they left for their respective destinations.



Foreign delegates at the Great Bath, Moenjodaro.

Introduction

by

S. A. Naqvi

"If nothing is done, all the existing excavations at Moenjodaro will crumble within the next 20 to 30 years, and one of the most striking monuments of the dawn of civilization will be lost for ever". This was the assessment of the situation in 1964 by Dr. Harold J. Plenderleith, a world-renowned archaeological conservator and the Director of the International Centre for the Study, Preservation and Restoration of Cultural Property, after his visit to this ancient site as the Leader of the first Unesco Mission to Moenjodaro. The position has not improved since; and it is high time that the world's conscience is aroused to save this heritage of mankind. It is a paradox of facts that the structural remains of Moenjodaro, buried under the accumulations of thousands of years, remained in an excellent state of preservation until they were exposed to the incredulous gaze of the twentieth century about 50 years ago. Soon after the excavations, these remains were afflicted by the plague of waterlogging and the leprosy of salinity. These two diseases, combined with the threat of erosion by the River Indus, now pose a grim threat to its very existence.

Moenjodaro is an important metropolis of the great Indus Valley Civilization which flourished between 2500-1500 B.C. It is situated about 250 miles north of Karachi, and presents an outstanding example of well-organized civic life. The wide straight roads dividing and subdividing the city in square blocks, the well-planned houses with two and three storeys and the underground system of drainage remain an inspiration for the present-day town planner. Large-scale excavations conducted at the site have revealed an amazing story of the customs, arts and crafts, social system and economic life of the people who inhabited it. The pictographic script found on the seals and sealings, and a number of other antiquities unearthed at Moenjodaro, further bears an eloquent testimony to the heights attained by that society.

The importance of Moenjodaro, as such, is recognized universally, not only as a seat of one of the most ancient cultures of the world, but also as a landmark in the history of the development of human civilization. The Government of Pakistan has left no stone unturned to preserve this site. But, due to its limited financial resources not commensurate with the magnitude of the problem posed by Moenjodaro, it has not been possible to achieve the desired results. Under these circumstances, negotiations were started with the Unesco, as a result of which during the past 10 years, several Unesco experts and missions of experts were sent to Moenjodaro to study the problem. The first Unesco Mission of Experts, headed by Dr. H. J. Plenderleith with Theodoor de Beaufort and Dr. Caesar Voute as members, visited Moenjodaro in January 1964. This was followed by the visits of Prof. S. J. Van Kregten in June, 1966 and Mr. L. C. Krepal in 1966 and 1967. A few eminent archaeologists, including Sir Mortimer Wheeler, Prof. K. Michalowski, Prof. J.O. Brew, Prof. C. Schaeffer, were invited in 1968, with the assistance of Unesco, to make a study of the danger faced by Moenjodaro. Finally, a Unesco Mission of Experts comprised of Dr. Zaky Iskander, Mr. Raoul Curiel and Mr. S. Van Kregten visited Moenjodaro in 1972. This Mission, along with experts from Pakistan, after further study of the problem and taking account of the observations and suggestions made by earlier Missions, prepared a comprehensive Master Plan for the preservation of Moenjodaro.

This Plan proposes to deal with the problem

River Indus overflowing its ba



in three directions, namely: ground-water control; protection against the River Indus, and physical conservation of the structural remains. The ground-water table is to be lowered in three stages. In the first stage, a ring of 14 tubewells are to be installed, which will lower the water-table by 20 feet. Twelve additional wells in the same circle, will help to reduce the water-table by up to 32 feet in the second stage, and finally 30 tubewells, installed in a second ring should be capable of maintaining the water-table at 65 feet below ground-level by operating at 74 per cent operation factor. Such a lowering of the water-table would not only benefit the world famous remains of Moenjodaro, but would also promote the economic development of the area. An average of 123 cusecs of water pumped from these wells would help an area of 15,000 acres to achieve a high intensity of agriculture. Rough estimates of cost and production indicate that the net income of the farmers of this area would increase by 13 times and gross production by 8 times. In addition to its promotion of the Moenjodaro area as a model of agricultural development, this indirect investment in irrigation would also result in extra revenue for the Government, which could be used to underwrite a major share of the operational costs of the proposed tubewells.

The ravages of the River Indus, caused by its ever changing course, are well-known from times immemorial. Even the destruction of Moenjodaro has been attributed to it by certain archaeologists. With its ever-shifting course and overflowing banks, the River Indus is still a great danger to this invaluable heritage of mankind. It is, therefore essential that appropriate measures should be taken as soon as possible to ward off this danger. In this connection, relevant studies have been carried out through the Irrigation Research Institute at Lahore, and a plan has been prepared in accordance with these studies. It lays down that the system of training the river for the protection of Moenjodaro should be on a permanent footing, so that:

(a) it pins down the extreme limit of the river current at an optimum safe distance from the right, existing edge of the river;

(b) the river training system is subject to a minimum severity of attack during its life span, so that its maintenance cost may be minimized;

(c) the system does not create any erosion problems elsewhere.

For this purpose, the Report proposes a hockey-cum-T-cum-sloping Spur and a Guide Bank. The proposed system is considered a safe measure to protect Moenjodaro from the ravages of the Indus; and the Unesco and Pakistani experts have approved the scheme for implementation as soon as possible. The other benefits accruing from this measure will include protection to the thousands of acres of agricultural land on the right bank of the Indus and also a large number of villages in that area.

The remarkable structural remains at Moenjodaro, when excavated, were in an excellent condition. After their exposure and contamination with salts present in the soil, they started disintegrating. With the introduction of the Sukkur Barrage Irrigation system in the early thirties, the situation deteriorated further, and a new element, i.e. the rise in the subsoil water affecting the structures was noted. The water-table at the time of the commencement of excavations was about 25 feet below the surface, but later on rose to 15 feet in winter and 7 feet in summer. As a result of these extraordinary forces of destruction, the 5,000-year-old city site of Moenjodaro is seriously threatened with complete disintegration. Even after the root cause threatening the existence of Moenjodaro

has been removed by ground-water control, as maintained earlier, it would still be essential to take further measures for the proper conservation of the structural remains.

A reference to the document will show that only such measures as are absolutely essential for the preservation of the crumbling structures have been recommended; and there can be no two opinions on their application. These measures are both preservative and protective in nature. A large number of walls at the site have been undermined by the effect of salts and are sagging precariously. Such structures must be treated immediately by underpinning the decomposed portions, otherwise they are liable to collapse. In order to protect the structures from the capillary action that draws water and salts up into them, it is essential to provide damp-proof courses. Mud-brick capping over the walls, which has already been used successfully by the Department to protect them from the effects of salts, should be continued. At the same time, provision for proper drainage of rain water from the excavated area is absolutely essential. Equally important is the removal of salt-affected earth from these areas and the dumps of debris in their vicinity. All these measures will be taken under the supervision of a highly competent and qualified staff, as spelt out in detail in the Document. The Plan also includes provisions for the cultural development of the site.

The total Project is estimated to cost about 11 million U.S. Dollars. As a glorious heritage of mankind, Moenjodaro certainly deserves the sympathy and concern of the entire civilized world. It is a matter of great satisfaction that Unesco has taken due notice of the situation, and that in its last General Conference, held in October 1972, it has approved a major project for international assistance. The International Symposium held at Moenjodaro from February 23 to 25, 1973, in collaboration with Unesco, has also strongly recommended that immediate steps should be taken to implement the Master Plan for its preservation.



The Education Minister discussing the Moenjodaro Project with the delegates.

PART ONE

SECTION I : PAPERS

Present State of Research ON the Indus Valley Civilization

M. Rafique Mughal

A GREAT deal of research has been done on various aspects of the Indus Civilization since its discovery fifty years ago, but much remains to be accomplished to enhance our understanding of this highly developed, fully urbanized and most extensive civilization of South Asia. During the last fifty years, most research in the Indus Valley proper, and the adjoining Indian territory, was oriented towards further elaboration of certain specific aspects of the Indus Civilization. With new discoveries, the interest of scholars has been further intensified and they are now offering fresh interpretations of both old and new data, and are asking many new questions about cultural and chronological reconstructions. In this process of healthy debate, we may agree or disagree with any or none of the views expressed, but it is all indicative of the world-wide interest which the Indus Civilization has aroused. This paper is intended to review past developments in research which have contributed to our understanding of this Civilization in relation to its origin, growth and decline, and also its geographical extent within and beyond the Indus river valley proper, during the third and second millennia B.C.

The initial impact of the discovery of identical remains of material culture at two widely separated and very large settlements, Harappa and Moenjodaro, was considerable and immediately led to prolonged excavations at Moenjodaro between 1922 and 1931, first under the general supervision of Sir John Marshall, and then by E.J.H. Mackay.[1] It goes to the credit of a succession of early excavators of the old Archaeological Survey of British India, to uncover a considerable part of the city and to collect a wide range of material equipment. The emphasis has been, understandably, to expose the city plan and recover as many antiquities as possible to enable the excavators to present a fairly good picture of the Civilization's material aspect. The same trend was witnessed at Harappa where, between 1921 and 1937, D.R. Sahni, M.S. Vats and K.N. Sastri uncovered the city plan with a citadel, recalling, in general lay-out, that of Moenjodaro.[2] However, some specific details of the buildings and, especially, the stratigraphic position of artifacts, necessary for understanding the growth of the cities, were left out by early excavators. In 1946, Sir Mortimer Wheeler added new dimensions to the defensive aspect of the Indus Civilization by excavating the huge mud-brick fortification at Harappa.[3] The search for a similar feature led him to excavate at Moenjodaro in 1950, where he and his Pakistani colleagues also tried to reach the waterlogged lower levels near the citadel mound[4] (PL. I). But the problem of the high water-level frustrated all attempts to plumb the earliest horizons. During the excavations of

1 Sir John Marshall, *Moenjodaro and the Indus Civilization*, 3 vols. (London, 1931); and E.J.H. Mackay, *Further Excavations at Moenjodaro*, 2 vols. (Delhi, 1938). The spellings of MOENJODARO as written in this paper are currently being followed in Pakistan.

2 M.S. Vats, *Excavations at Harappa*, 2 vols. (Calcutta, 1940).

3 R.E.M. Wheeler, 'Harappa 1946: The Defence and Cemetery R 37', *Ancient India* (Delhi, 1947), no. 3, pp. 59-130.

4 Full report is not yet published. Preliminary account by Leslie Alcock, in *Pakistan Quarterly* (Karachi, 1952), vol. 2 (1), pp. 12-16.

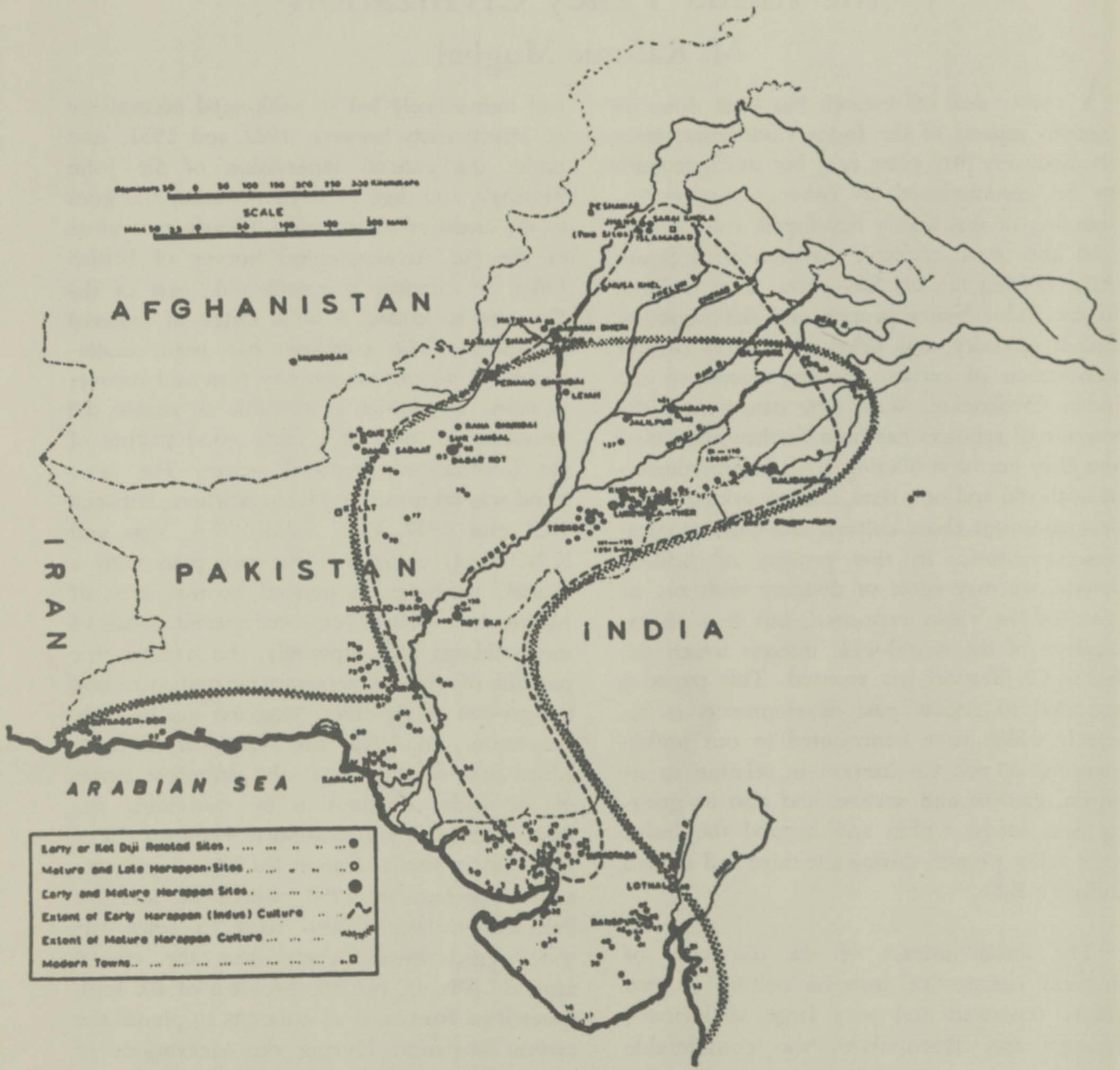


Fig. 1. The Indus Civilization during its mature and later periods covered almost the same area which was previously dominated by the early cultures (Amri, Kot Diji and Sothi) of the late fourth and early third millennia B. C.

1964, Dr. George F. Dales carried out three test borings at the site PL. 1-b, which indicated signs of an ancient habitation 39 feet below the present surface on which the existing mound, 35 to 40 feet high, stands.[5] Thus, we are made aware of the fact that the excavated remains at Moenjodaro represent about half the total history of its growth. Unfortunately, the gradually rising level of the ground water is progressively complicating our efforts to probe the early horizons of Moenjodaro.[6]

When large-scale excavations were in progress at Moenjodaro and Harappa, N.G. Majumdar located a number of settlements contemporary with Moenjodaro, and even of an earlier date, during his explorations in 1927-31 along the west bank of the Indus in Sind.[7] Later, in 1942, numerous settlements of the Indus or Harappan culture were recorded by Sir Aurel Stein along the dried bed of the Ghaggar-Hakra river in the central Indus Valley near Bahawalpur.[8] The number of Harappan sites in the Indian territory, as known in 1947, was few. The known sites, including the major ones, were mostly located in Pakistan, a situation which prompted Indian archaeologists to carry out an intensive search along the borders of Pakistan. As a result, an impressive number of settlements, contemporary with Harappa and Moenjodaro and of a later period, have been mapped in Rajasthan and Gujrat.[9] Three principal sites—namely, Kalibangan, Lothal and Rangpur—have also been subjected to systematic excavations for nearly a decade.[10] Recently (1972), Mohammad Sharif of Pakistan's Department of Archaeology has recorded a large Harappan settlement (No. 54), known as Gharo Bhiro, in south-eastern Sind, located on the route which was followed by the people of the Indus Civilization on their migration to Kutch and Saurashtra. Today, the northernmost limit of the Indus Civilization is not Rupar only, but extends up to the Gomal Valley, located at the eastern foot of the Sulaiman range where Dr. A.H. Dani has recorded a group of nine prehistoric sites, among which two sites, Gumla and Rahman Dheri, seem to be very important.[11]

The settlement pattern of the Indus Civilization has not yet received serious attention. As the distribution of the Harappan sites reveals, the Indus Civilization was confined essentially to the vast plain of the *Greater Indus Valley*—the Indus and Ghaggar-Hakra river systems—and along the coast of the Arabian Sea. The Indus culture does not seem to have penetrated deeply into the Baluchistan hills. All the known sites, including those identified by the present

5 George F. Dales, 'New Investigations at Moenjodaro', *Archaeology* (New York, 1965), vol 18(2), pp. 145-150; 'Civilization and Floods in the Indus Valley', *Expedition* (Philadelphia, 1965), vol. 7(4), pp. 10-19, and Re-opening Moenjodaro Excavations', *Illustrated London News*, May 29, 1965.

6 Various schemes for lowering the Water-table were prepared and many Unesco experts have studied the problem. For technical reports, see *Preservation of the Monument of Moenjodaro, Pakistan* (Paris, 1964), Unesco; F.A. Khan, *Preservation of Archaeological Remains at Moenjodaro* (Karachi, 1970), Deptt. of Archaeology; and *Master Plan for the Preservation of Moenjodaro* (Karachi, 1972), Deptt. of Archaeology. Document No. 9-4-1972-Arch.

7 N.G. Majumdar, Explorations in Sind, Memoirs of the *Archaeological Survey of India, No.* 48 (Delhi, 1934); K. Deva and E.D. McCown, 'Further Exploration in Sind: 1938', *Ancient India, No.* 5 (Delhi, 1949), pp. 12-30.

8 A Stein, 'A Survey of Ancient Sites Along the "Lost" Sarasvati River', *Geographical Journal* (1942), Vol. 99 (4), pp. 173-182. Some sites were revisited by Henry Field in 1955, 'An Anthropological Reconnaisance in West Pakistan, 1955', *Papers of the Peabody Museum of Archaeology and Ethnology, Harvard University,* Vol. LII (Cambridge, Mass. 1959), pp. 162-177 and 189-192.

9 Reported in *Indian Archaeology: A Review* (New Delhi), 1953 through 1968-69.

10 For preliminary accounts, *ibid*; also in Illustrated *London News*, March 24, 1962; S.R. Rao in *Lalit Kala* (1957), Nos. 3-4, pp. 82-89, and *loc. cit.*, No. 11, pp. 14-30, 1962; *Ancient India* (1963), Nos. 18 and 19, pp. 5-207.

11 Ahmad Hasan Dani, 'Excavations in the Gomal Valley'. *Ancient Pakistan* (*Peshawar,* 1971), Special Number 5, pp. 22-34 *passim.* The other Harappan sites include, Hisan Dheri, Bud-ki-dherai & Mahra Sharif in the Gomal Valley; Musa Khel, thirteen miles north of Miànwali, and Laiya, north of Dera Ghazi Khan, both sites located east of the Indus.

author in 1972, are situated along the hilly borders, at the strategic passes and on the main overland routes, such as the site of Pathani Damb on the Mula river, Gudri in the Bolan Pass, Dabar Kot and Kaonri in the Loralai Valley, located on the ancient line of communication leading to southern Afghanistan, and Periano Ghundai in the Zhob Valley of northern Baluchistan, which joins the Gomal Pass. The evidence shows that the area covered by the Indus Civilization was larger than any of the known civilizations of the ancient world. Starting from the borders of Afghanistan, in northern Baluchistan (at Periano Ghundai), and the Iranian border on the Mekran coast (at Sutkegan-Dor), it extended east and south-east and covered the entire Mekran coast, the Greater Indus Valley and Gujrat. Beyond the vast plain of the Punjab, including that part which was formerly drained by the Ghaggar-Hakra river, remains of the Indus culture have also been found near Delhi in the Ganges-Yamuna *Doab* (Fig. 1). This enormous area could not have been limited to only 144 sites (the number so far securely indentified) and, indeed, claims have been made for the discovery of twenty-seven sites of Harappan affinity in east Punjab and the *Doab* near Saharanpur[12] (Fig. 5).

Lately, Indian, and some Western, archaeologists have been insisting on a change of name, and favour the term 'Harappa Culture' instead of the 'Indus Civilization', since the former follows the site-name where the Civilization was first discovered and recognized. However, despite the discovery of new sites in Indian territory, an overwhelming number of Harappan sites occurs west of the Ganges-Yamuna *Doab*, in the vast plain drained by the Indus river and its present or former tributaries, which include the dried-up Ghaggar-Hakra river. The Rann of Kutch itself is formed by and lies in the Indus deltaic region. Thus, in addition to the archaeological evidence revealed by the distributional pattern of the Harappan settlements, there are geographical considerations to justify retention of the name, Indus Valley Civilization, which conveys the highly evolved expression of the Harappan culture. The spread of Harappan culture beyond the main Indus Valley should not astonish for, likewise, cultural traits of the Mesopotamian Civilization are found in Khuzistan in south-western Iran, in Saudi Arabia and along the Arabian coast of the Persian Gulf.

The distribution of the Harappan sites, at first sight, gives an impression of an Indus 'Empire', encompassing Pakistan and the western part of modern India. Such an impression would be erroneous because we have yet to determine how many Harappan settlements were contemporary with each other at one specific time. Already, the Harappan remains excavated at several sites, some of which have been dated by radiocarbon tests, have indicated that most sites in the Kutch and Saurashtra area, and those which penetrated into the *Doab*, represent later movements of the people from the Indus Valley proper. It is, however, not yet certain what circumstances forced such a migration and what fate befell the principal

12 About one hundred sites are listed in R.E.M. Wheeler, *The Indus Civilization*, Third Edition (Cambridge, 1968), pp. 138-140, with further bibliographical references. More Harappan sites, mostly unpublished, in the Bahawalpur-Bikaner area are listed by M.R. Mughal, *The Early Harappan Period in the Greater Indus Valley and Northern Baluchistan* (c. 3000-2400 B.C.), (Ph.D. Dissertation, University of Pennsylvania, 1970) pp. 158-160. In addition to the sites in the Gomal Valley (Dani, *op., cit.*), nearly one hundred sites are reported by Suraj Bhan in the east Punjab & Northern Rajasthan, in D. P. Agrawal and A. Ghosh (edts.) *Radiocarbon and Indian Archaeology* (Bombay, 1973), in press and *New Archaeological sites in Lasbela* (Karachi, 1973). For listing of sites in Gujarat (Kutch and Saurashtra), S.R. Rao, 'Excavation at Rangpur and other exploration's in Gujrat', *Ancient India*, No. 18-19 (1963), pp. 205-7; and B.M. Pande and K.S. Ramachandran, *Bibliography of the Harappan Culture* (Florida, 1971), pp. 37-42. The listing of sites located in Pakistan is incomplete given in the above publication.Most recently, Abdur Rauf Khan of the Geography Department, University of Karachi, has located several Harappan sites near Karachi, which are reported in *Ancient Settlement in Karachi Region* (Karachi, 1968).

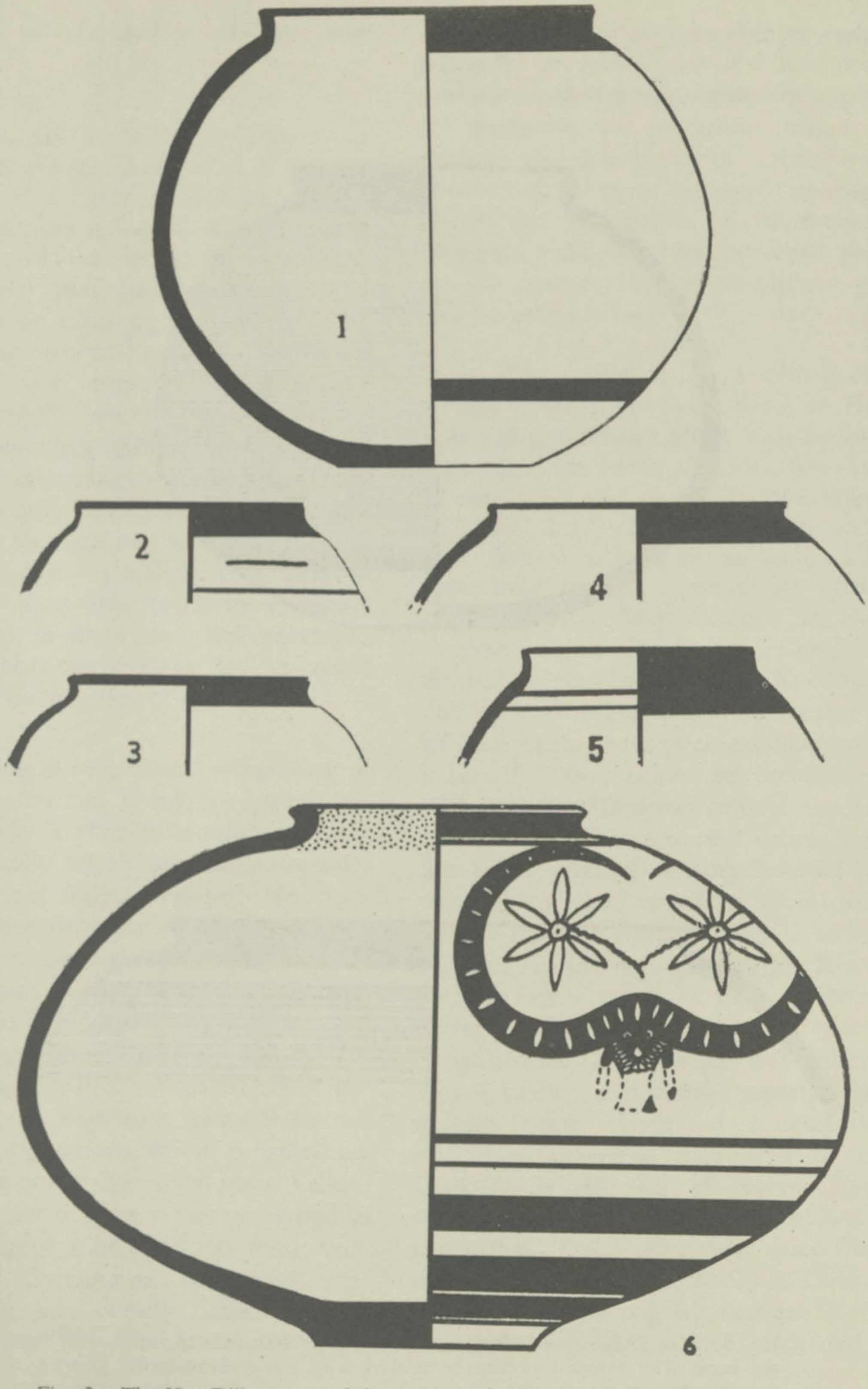
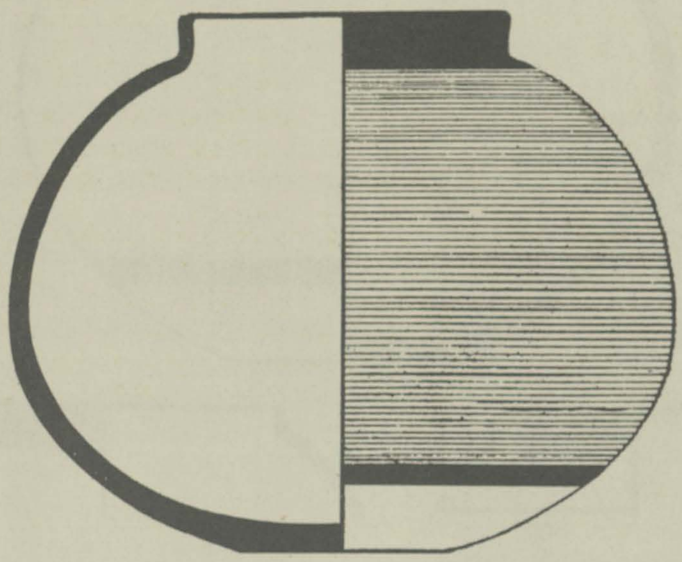
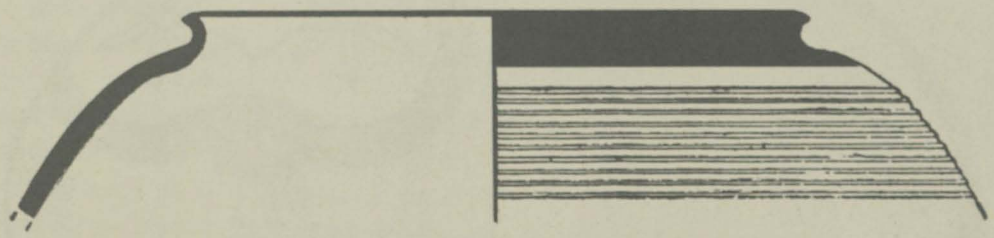


Fig. 2. The Kot Dijian ware of the early third millenium B.C. which occurs at several sites in the Greater Indus Valley. 1, Sarai Khola-II; 2-3, Harappa (pre-defence levels); 4-6, Kot Diji. The horned motif on human head is identical to those found at Gumla-II & III.



1



2

Fig. 3. Kot Dijian vessel forms with distinctive black painted bands usually on the neck. The external surface is marked with horizontally-drawn grooves, a feature which is peculiar to the Kot Dijian wares of the central and northern Indus Valley and also of the Zhob Valley. 1, Sarai Khola-II; and 2, pre-defence levels of Harappa (see also Pls. IV & V).

urban centres of Moenjodaro, Harappa and Kalibangan.

The picture of the Indus Civilization, as presented to us through many years of excavation, is that of a highly disciplined society, possessing sufficient economic wealth to mobilize labour and to support full-time craftsmen. It also possessed resources to engage in long-distance trade or exchange of products. The existence of interrelated but highly developed socio-political and religious institutions, as reflected through their well-planned cities, public buildings, large fortifications, granaries and standardization of material equipment through mass production, is evident. Further excavations at the same sites and new investigations at other sites are adding more detail to the picture. At most sites, the Harappan culture is encountered in its mature and developed form. This phenomenon has led to much discussion on the question of its origins.

The question of origins or the beginning of the Indus Civilization, it may be stated, has two aspects: (a) a clear delineation of those cultural materials which are chronologically earlier than the fully developed Harappan culture and a reconstruction of the early cultural phenomenon vis-a-vis the Indus Civilization; (b) reconstruction of processes which may have developed into urbanization. Due to lack of information relevant to this problem, it was popularly thought that, if not the people, at any rate, the idea or inspiration came from the west (i.e. Mesopotamia), where urbanization had taken place earlier than in the Indus Valley. This suggestion was based on certain tangible evidence of contacts between the Indus and Mesopotamian Civilizations. As regards the cultural phenomenon which existed in the Indus Valley prior to urbanization, investigations carried out at a number of early sites during the last fifteen years or so have provided considerable data which, ultimately, might alter our theoretical and conceptual framework regarding the emergence of urbanization in South Asia. It seems necessary to emphasize the relevant information on the fundamental question of the early developmental phase of the Harappan culture and its ultimate growth into full urbanization.

In 1946, a total of 191 potsherds of non-Harappan character were found at Harappa from the pre-defence levels and the building materials of the fortification wall. Among these, 35 came from two clearly stratified layers (26) and (26A) lying under the defence wall, and were thought to represent an occupation by a community having a variant or even alien culture.[13] This "alien" culture at Harappa, received proper definition and elaboration by Dr. F.A. Khan's excavations at Kot Diji (1955 and 1957), a fortified settlement located on the left bank of the Indus river and opposite Moenjodaro.[14] There, below an occupation containing mature Harappan cultural materials, an accumulation of occupational debris, about 16 feet thick, revealed an abundance of pottery identical to that recovered from the pre-defence layers at Harappa (Figs. 2 and 3, and PL II-6, 7). Although most of the Kot Dijian pottery forms reflect a basic difference in pottery tradition, some forms and decorative designs, such as fish-scale and intersecting circles, and other materials, namely terracotta toy-cart frames, wheels and triangular 'cakes', which are otherwise considered to be the characteristic elements of mature Harappan culture, occurred in the mid-levels of Kot Dijian occupation. Two radiocarbon dates from the upper and lower (last but two) Kot Dijian levels in the citadel mound fall between 2605+145 and 2090+140 B.C., when calculated on a

13 R.E.M. Wheeler, 'Harappa 1946: the Defences and Cemetery R37, *Ancient India*, No. 3 (1947), Figs. 8-9 and PL: XL-XLII.

14 Excavations at Kot Diji, *Pakistan Archaeology*, No. 2 (Karachi, 1965), pp. 11-85.

half-life of 5730 years (or 3155 and 2590 B.C. with appropriate MASCA factors added).[15] The first occupation in the unwalled outer area, corresponding to the mid-levels of the citadel, gave two C-14 dates: 2335±155 and 2255±140 B.C. (or 2885 and 2805 B.C. with MASCA factors added). Chronologically, the priority of the Kot Dijian occupation over the succeeding Harappan culture is evident. The Indus Civilization is known to have been at a mature stage by 2371 B.C., contemporary with Sargon of Akkad in Mesopotamia. Seven carbon-14 dates are available from the upper levels of Moenjodaro which fall between 2083±66 and 1760±115 B.C. (or 2583 and 2060 B.C. as adjusted).

The relevant information from the 'early' levels of Moenjodaro itself has not received proper emphasis from scholars. It may be recalled that in 1932, E.J.H. Mackay excavated a small area, 18 x 14 feet, in the DK Area, Section G (House III, Room No. 76), down to 42 feet from an arbitrary 'datum'. The 'early' levels as defined by Mackay, start at the depth of 28 feet below the 'datum'. Some potsherds recovered by him between the depths of 31.8 and 42 feet were unlike most of the characteristic Harappan ceramics. Among a few illustrated examples, two are precisely indentical in fabric and surface decoration with the so-called 'wet' ware, commonly found in Damb Sadaat levels I and II in the Quetta valley and distributed extensively in northern and central Baluchistan[16] (PL. II). Damb Sadaat I and II are assignable to 2510±70 and 2200±76 B.C. (or as corrected by MASCA to 3060 and 2700 B.C.). The most significant evidence is the occurrence of wet ware, of the type found in early levels of Moenjodaro, in association with the characteristic Kot Dijian ware at Damb Sadaat. It should be added that the famous piece of a carved steatite vessel having analogies with those from several sites in Iran and Mesopotamia was found along with 'wet' ware at Moenjodaro (PL. II, 4 and 5). A similar change in ceramics was noted during the excavation of 1950. Pottery from the waterlogged levels, as reported by Leslie Alcock was " . . . crude, vigorous, and unstandardized", and was thought to belong to a period " . . . far earlier than anything previously discovered on the site (of Moenjodaro)".[17] The available evidence pertaining to early Moenjodaro is limited but very intriguing, and raises the possibility of finding materials comparable to Kot Diji or related cultures, but this would involve deep digging, which can be undertaken only when present obstacles have been removed.

New field researches justify our affirmation that the Kot Dijian occupation was not an isolated phenomenon at Kot Diji only, but was widespread throughout the Greater Indus Valley and in the valleys of northern and central Baluchistan.[18] It extended even south-east up to the Great Rann of Kutch where, at Surkotada, J.P. Joshi is finding early materials lying below the Harappan remains.[19] Another astonishing feature, as demonstrated by the geographical

15 All C-14 dates quoted in this paper are calculated on a new half-life of 5730—40 years (instead of the old half-life of 5568—30 years) as published in *Radiocarbon* (New Haven, Connecticut) annually since 1959. Recently, new correction factors were proposed by the Museum Applied Science Center for Archaeology (MASCA) of the University Museum of Pennsylvania University, see E.K. Ralph and H.N. Michael (edts.), *Dating Techniques for Archaeologists* (Cambridge, Mass., and London, 1971), pp. 1-48, and also 'Radiocarbon Dates and Reality', *MASCA Newsletter*, Vol. 9(1), (Philadelphia, 1973).

16 M.R. Mughal, *The Early Harappan Period in the Greater Indus Valley and Northern Baluchistan* (*c.* 3000-2400 *B.C.*), Ph.D. Dissertation, University of Pennsylvania, 1970, pp. 76-79. For specific parallels, Mackay, *Further Excavations at Moenjodaro* (1938), II. PL. LXVII, no. 1-2 cf. W.A. Fairservis, Excavations in the Quetta Valley, West Pakistan, *Anthro. Pap. of the American Museum of Natural History*. (1956), Vol. 45 (2), pp. 268-270; also found by the author during explorations of Baluchistan in 1972.

17 Leslie Alcock, 'Exploring Pakistan's Past: The First Years' Work', *Pakistan Quarterly* (Karachi, 1962), Vol. 2 (1), pp. 12-16.

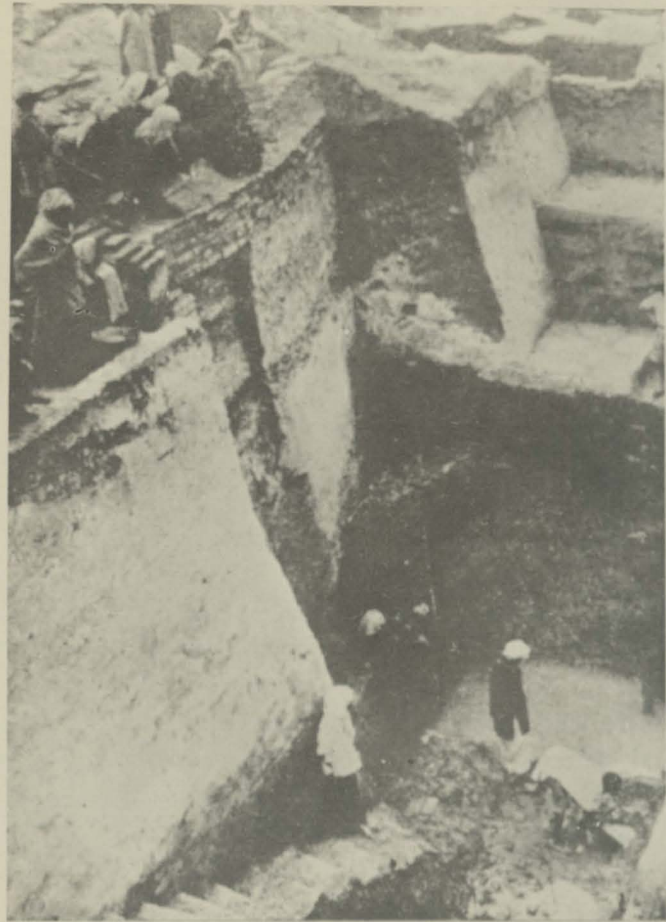
18 Mughal, *op. cit.*, pp. 98-100 and Table 4, pp. 156 and 117-124.

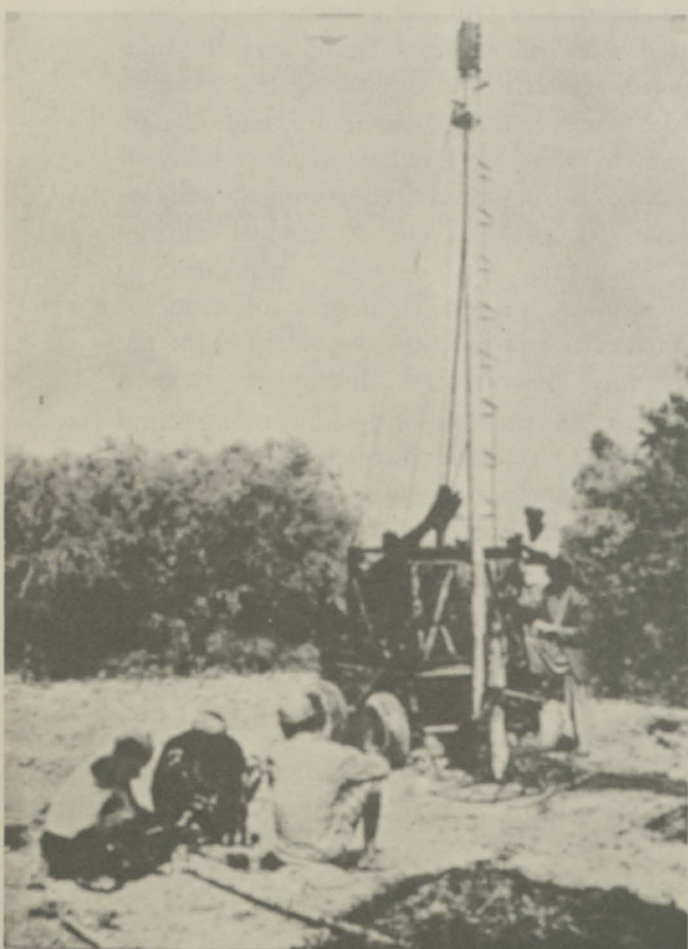
19 Jagat Pati Joshi, 'Exploration in Kutch and excavation at Surkotada and new light on Harappan migration', *Journal of Oriental Institute* (Baroda, 1972), Vol. 22 (1-2), pp. 122-137.

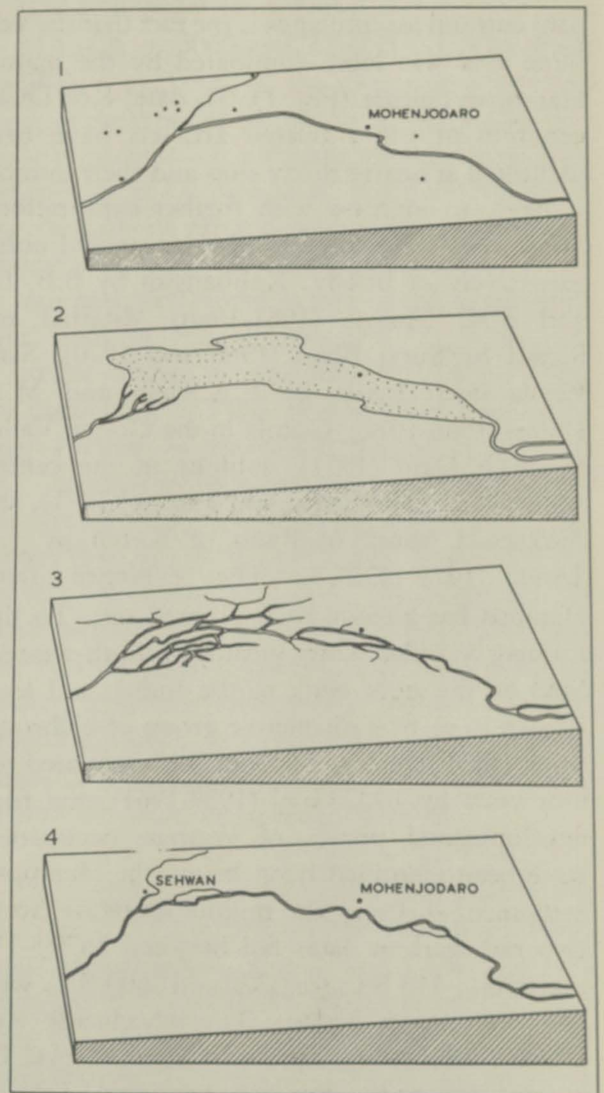
extent of the Kot-Dijian-related early (Harappan) cultural assemblages is the fact that the very same area was later dominated by the mature Harappan culture (Fig. 1). To date, Kot Dijian ceramics or other related artifacts have been identified at nearly thirty sites and their number is likely to increase with further explorations. Some sites have already been excavated either extensively or briefly: Kalibangan by B.B. Lal and B.K. Thapar (1961-1968) Mitathal and Siswal by Suraj Bhan (1968 and 1970), Sarai Khola near Taxila by F.A.Khan and M.A. Halim (1968-1972), Gumla in the Gomal Valley by A.H. Dani (1971), Jalilpur in the central Indus Valley by the present author (1971), and Surkotada, south of Rann of Kutch by J.P. Joshi (1971-1972).[20] The evidence from Harappa has already been pointed out. To this list may be added Amri, located in south-western Sind on the right bank of the Indus, and long known to us by a distinctive group of bichrome ware called Amrian. The site was excavated for four years by J.M. Casal (1959-1961), and four developmental phases of Amrian occupation have been identified lying below the Harappan settlement.[21] From the middle levels of Amri, two radiocarbon dates fall between 2670±113 and 2900±113 B.C. (or 3320 and 3600 B.C. with MASCA factors added). The wheelmade Kot Dijian ware first appears in the earliest level IA at Amri among the dominant handmade Amrian ware. The inference would be that the radiocarbon date of 2605±145 (or 3155 B.C.) from lower level (14) at Kot Diji might be too 'late' and calls for reconsideration. The first occupation at Kot Diji might have begun towards the end of the fourth millennium B.C. At another contemporary site, Kalibangan, the earliest levels, occurring below the mature Harappan remains, produced pottery comparable with that from the pre-defence levels of Harappa and with Kot Dijian ware, along with a new white-and-black on red pottery called 'Sothi'. Eight C-14 dates from the Sothi levels or Kalibangan-I fall between 2370±115 and 1825±110 (or 2920 and 2125 as adjusted), a surprisingly low date. The Kot Dijian wares in Gumla levels II-III (underlying the mature Harappan occupation at that site) are assignable to 2248±74 (or 2798 B.C.). It is important to note that some materials which are generally associated with the mature Harappan culture, are found among these early Harappan cultural assemblages at all the sites, which were either reoccupied later by the mature Harappan culture (Kalibangan, Harappa, Gumla, Kot Diji and Amri) or were deserted (Jalilpur and Sarai Khola). Furthermore, despite regional diversity marked in pottery, there is a general pattern of uniformity in the ceramic types and other materials among these early Kot Diji-related settlements throughout the Greater Indus Valley. These similarities are not restricted to pottery alone; we observe that fortifications had already emerged at Kalibangan, Kot Diji and contemporary Amri-related sites of Kohtras Buthi and Pokhran in south western Sind, indicating that changes in the socio-economic structure had already begun. In domestic architecture, a stability of residence is suggested by prolonged and intensive occupation, and a gradual change was occurring from simple enclosures to multiroomed houses. A degree of class or occupational stratification is evident from the uniformity of ceramics distributed over a large area. The presence of the bull among found remains and terracotta figurines, toy-cart frames and wheels suggest the availability and use of means of transport for frequent interaction among various populations in the Indus. Long-

20 *Indian Archaeology: A Review* (New Delhi, 1961-62), pp. 39-44; (1962-63), pp. 20-31; (1963-64), pp. 30-39; and (1967-68), pp. 42-45 for Kalibangan; *Pakistan Archaeology* (Karachi, 1972), pp. 23-89 for Sarai Khola; *Ancient Pakistan* (Peshawar 1971), Vol. 5 for Gumla. *Journal of Haryana Studies* (Kurukshetra, 1969), Vol. I (1), pp. 1-15 for Mitathal; and *Puratattva.* Bulletin of the Indian Archaeological Society, (New Delhi, 1971-72), No. 5, pp. 44-46 for Siswal. The report on Jalilpur is under preparation by M.R. Mughal.

21 Jean—Marie Casal, *Fouilles d'Amri.* 2 Vols. (Paris, 1964), with summary in English.


a


b



c

(a) Excavations at Moenjodaro in 1950. The lowest levels could not be reached because of high water-table.

(b) In 1964, borings at Moenjodaro revealed that ancient occupation extends to a depth of thirty-nine feet below the present flood-plain. The mound itself stands 35-40 feet high above the surrounding level.

(c) The flooding of Moenjodaro due to geologic disturbances as visualized by G. F. Dales and R. L. Raikes (2), followed by "rejuvenation of the Indus channel" (3), and emptying of a shallow lake (4).

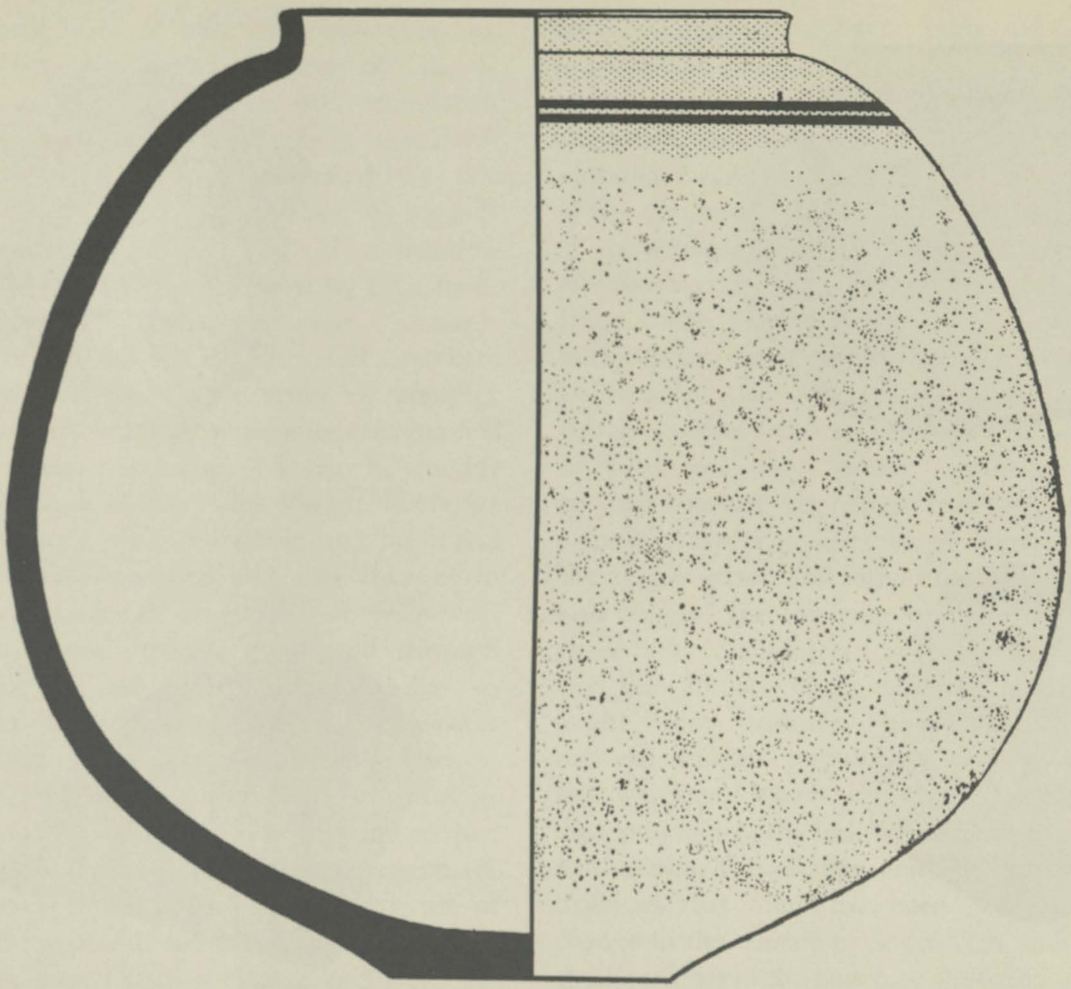


Fig. 4. Large vessel of Kot Dijian type with wide band in red painted on the neck and shoulder and bordered by black lines. From Sarai Khola-II. Also reported from Gumla II & III and the Zhob Valley.

distance trade or exchange is indicated by the presence at Sarai Khola, Jalilpur and Pandi Wahi, of lapis lazuli, originating from sources in Badakhshan in north Afghanistan. Thus, before the rise of large cities of the Indus Civilization, a widespread cultural phenomenon, constituting early, formative phase of the Harappan culture, had already set a permanent and uniform pattern of essential elements. It would seem that the processes leading to urbanization had already begun during the early third millennium B.C.; but it is not possible to reconstruct these fully in the present stage of our knowledge. Only two elements of the urbanized Harappan society of the mid-third millennium B.C. were lacking: (i) large cities and (ii) increased specialization to engage in full-time crafts like seal engraving, sculpture, metallurgy etc.

The location of both the early and mature Harappan sites, mostly along the former flood-plain of the rivers or permanent sources of water indicates favourable ecological conditions existing during the third millennium B.C., offering



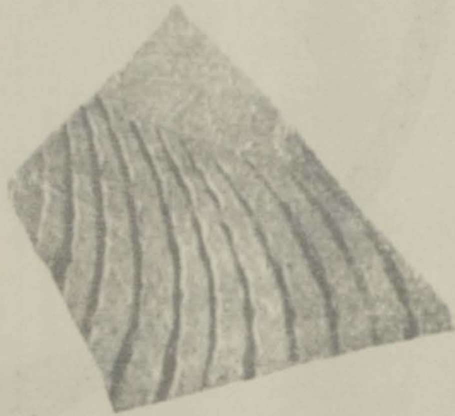
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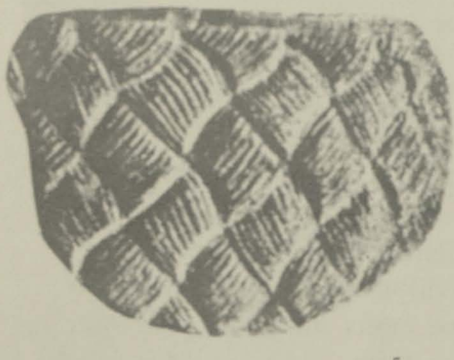
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1. *Short-necked vessel of red ware with grooved exterior from Sarai Khola II.* 2. *Fragment of 'Wet ware' from the 'early' levels of Moenjodaro found in* 1932. 3-4. *Identical 'Wet' ware from Damb Sadaat.* 5. *A carved steatite piece.* 6. *Fragment of red ware with grooved external surface and painted in black-on-red from Jalilpur period II.* 7. *Similar fragment from pre-defence level of Harappa.*

great possibilities of effective exploitation of land resources for sufficient means of subsistence. It is a question, therefore, whether a possible migration of people from the Baluchistan hills, or beyond, generated the rise of urbanization in the Indus Valley. As regards the suggestion that the 'idea' of civilization came from the west, it is argued by C.C. Lamberg-Karlovsky that processes towards urbanization in the Indus Valley and elsewhere could be generated by a series of complex interrelationships among populations maintained through trade or exchange.[22] It may be true for the early stages of the Indus Valley, where we notice that long-distance trade in lapis lazuli had already been established and that changes in social organizational structure were underway. However, more evidence is needed through archaeological and environmental studies to enable us to reconstruct evolutionary stages towards full urbanization. On present evidence, the mature Harappan culture at early Indus or Harappan sites arrives with a fully developed material culture. Does this sudden change mark a major shift in the socio-political structure of the Indus people? If so, what were the circumstances in which such a change occurred? At present, we have no evidence to answer these pertinent questions.

Where archaeologists cannot provide satisfactory answers to certain specific questions, natural and physical scientists are helping us with their experience and specialised knowledge. Working independently or with archaeologists, their contributions have been particularly significant in understanding the ancient climate and physical environment of the Indus Valley in early millennia, to determine possible causative factors leading to the decline of the civilization and in fixing the time range of the Harappan culture. As to the physical environment, it was generally thought that the Indus Valley must have enjoyed abundant rainfall in ancient times, necessitating a universal use of durable baked bricks in buildings and the provision of an elaborate drainage system. It was believed that only 'wetter' conditions could produce vast reserves of forest for firing millions of bricks. The representation of animals such as the tiger, elephant and rhinoceros on seals would also suggest the existence of dense jungles in those times. Such inferences led to the presumption that climatic changes in the Indus Valley might have produced a drastic imbalance between human populations and their subsistence base, which ultimately hastened the disappearance of the Indus Civilization. Contrary to this idea, R.L. Raikes and R.H. Dyson now maintain that there has been no appreciable change in the climate of South Asia and also of the Near East in the past nine thousand years.[23] They argue that the amount of silt deposited annually along the flood-plain of the Indus would be sufficient to produce dense jungle growth and make it a suitable habitat for the animals depicted on the seals. Moreover, the small size of the drains in the streets of Moenjodaro and Harappa, with their limited capacity, would itself indicate their function of carrying

22 C.C. Lamberg-Karlovsky, 'Trade Mechanisms in Indus-Mesopotamian Interrelations' *Journal of the American Oriental Society*, (New Haven, 1972), Vol. 92 (2), pp. 222-229, and 'Tepe Yahya 1971: Mesopotamia and the Indo-Iranian Borderlands', *Iran*, Vol. X, 1972, p. 99. Maurizio Tosi, however, suggests Iranian and Turkmenian influences on the origins of the Indus Civilization, 'Early urban evolution and settlement patterns in the Indo-Iranian borderlands', in C. Renfrew (edt.), *the Exploration of Culture Change: Models in Prehistory* (London 1973), pp. 444-46.

23. Robert L. Raikes and Robert H. Dyson, 'The Prehistoric Climate of Baluchistan and the Indus Valley, *American Anthropologist* (1961), Vol. 63, pp. 265-281. The palynological studies carried out in the East—Central Indus Valley, however, indicate that the Indus Valley *did* enjoy greater rainfall during the third millennium B.C. then today and that a significant shift towards dry conditions occurred about 1800 B.C., coinciding with the decline of the Indus Civilization. Gurdip Singh, 'Thd Indus Valley Culture seen in the context of post-glacial climate and ecological studies in North-West India', *Archaeological and Physical Anthropology in Oceania*' (University of Sydney, 1971), Vol. 6 (2), pp. 177-189.

water for domestic use only. Their arguments are generally accepted, though it is not certain whether the absence of a modern irrigation system would re-create suitable ecological conditions for supporting a civilization, or whether the whole valley would be a desert waste assuming an annual rainfall, as at present, of not more than 10 inches. The evidence of an ancient irrigation system consisting of canals or other means is lacking.

In recent years, the decline and end of the Indus Civilization has become a subject for considerable debate and sharp controversy. New avenues of enquiry are being opened, but we have still to understand how and why this highly developed and complex Civilization disappeared. The popular theories of adverse climatic changes and invasions from outside are being disputed on the basis of geographical and geomorphological factors cambined with archaeological evidence. At the same time, socio-economic models are being presented as the operative cause for the break-up of this Civilization. It would appear that this heated controversy has much to do with the question of emphasis on this or that causative factor, or on a combination of many causes. Among various opinions, the Aryan invasion around the middle of the second millennium B.C. is considered to have hastened the process of disintegration of an already weakened Civilization.[24] Alternately, it is asserted that we have to imagine that another civilization with fortifications arose in the Indus Valley which was encountered by the Rigvedic war-god, Indra, who is depicted as the destroyer of many forts. It is also thought that the people were already over-exploiting the land resources, and when the situation became critical with a possible increase in population numbers, they were forced to migrate to other areas.[25] Recently, Dr. G.F. Dales and R.L. Raikes have joined hands to tackle this problem.[26] They postulate that the Lower Indus Valley was flooded due to tectonic uplifts across the somewhere between Amri and Sehwan (PL-C). This natural phenomenon necessitated the building of earthen embankments around the city of Moenjodaro and the frequent rebuilding of dwellings in view of advancing floods. This process continued until "a phase of rejuvenation of the Indus channel" developed. The civilization was weakened due to relentless pressure exerted on the population and their economic resources. There have been sharp criticisms of this suggestion from G. Possehl and H.T. Lambrick based on the nature of the evidence used to support this theory.[27] Incidentally, Raikes' investigation in the east-central Punjab near Kalibangan has also indicated that, in ancient times, there have been frequent changes in the river course due to tectonic disturbances.[28] That the Indus Valley does fall within an active seismic zone was noted by Thomas Oldham a long time ago.[29] At present, however, whatever may be the merits or pitfalls of new theoretical frameworks, the happy collaboration of physical scientists with archaeo-

24 R.E.M. Wheeler, *The Indus Civilization*. Third Edition (Cambridge, 1968), pp. 129-134; and all his previous publications on Indus Civilization.

25 W.A. Fairservis, *The Roots of Ancient India* (London, 1971), pp. 296-311.

26 R.L. Raikes, 'The End of the Ancient Cities of the Indus', *American Anthropologist* (1964), Vol. 66(2), pp. 284-299. The idea was originally proposed by M.R. Shani, 'Bio-Geological Evidence bearing on the Decline of the Indus Valley Civilization', *Journal of the Palaeontological Society of India* (1956), Vol.1, pp. 101-107. Also, George F. Dales, in *Scientific American* (1966), Vol. 214(5), pp. 93-98; Dales and R.L. Raikes, 'The Moenjodaro Floods: A Rejoinder', *American* (1968), Vol. 70(5), pp. 957-961.

27 Gregory L. Possehl, The Moenjodaro Floods: A Reply, *American Anthropologist* (1967), Vol. 69(1), pp. 32-40; and H.T. Lambrick, The Indus flood-plain and the 'Indus' Civilization, *The Geographical Journal* (1967), vol. 133, pp. 483-495.

28 R.L. Raikes, 'Kalibangan: Death from Natural Causes', *Antiquity* (London, 1968), Vol. 42(168), pp. 286-291.

29 This important reference which supports the theory of tectonic upheavals has not yet been noted by Raikes. See *A Catalogue of Indian Earthquakes from the earliest time to the end of A.D.* 1869 (Calcutta, 1883).

logists in the solution of many a complex problem of the Indus Civilization is potentially significant.

On the question of the Indus contacts with contemporary civilizations, the basis of evidence previously rested on some seals of the 'Indus' type, several scattered pieces of metal types, etched carnelian and other segmented beads, some pottery forms and their painted style, stone vessels and other minor objects like dice, figurines etc., mostly found in Mesopotamian contexts.[30] In view of extensive excavations already done in Mesopotamia and on Indus sites, the available number of dateable materials was extremely limited. This was all the more surprising in the face of frequent references to the sea-borne trade of southern Mesopotamia with distant lands in hundreds of economic and religious texts, sometime between the Sargon of Akkad and Ur III to the Isin-Larsa periods (c. 2370-1900 B.C.). However, despite difficulties of limited evidence, the subject of Indus-Mesopotamian relations or contacts continued to occupy the attention of many scholars. This aspect is, in fact, of growing concern among South Asian and Near Eastern archaeologists even today. During the last fifteen years, new evidence has been added to the existing list of objects used for exchange. Recent researches are also reflecting a trend towards explaining or understanding the mechanism involved or implied in Indus-Mesopotamian relations.[31] As the evidence goes at present, scholars seem to be in general agreement on the identification of at least two of the three principal territories—Dilmun, Magan and Meluhha—mentioned in the cuneiform documents, and which are known to have participated in trade with Mesopotamia during the third and early second millennia B.C. Meluhha is most likely to be identified with the territory encompassed by the Indus Civilization, including the coastal areas of Pakistan and Western India, on which a number of Harappan settlements are located. The island of Bahrain, located close to southern Mesopotamia and near the Arabian side of the Persian Gulf, fits well with the description of Dilmun and is also consistent with the archaeological evidence found recently. The exact location of Magan is not clear but it is generally thought to have included the south-eastern part of Iran excluding perhaps the then hostile territories of Elam in southern Iran.[32]

In 1932, C.J. Gadd pointed out stylistic similarities of a group of seals from Ur, and elsewhere in Mesopotamia, with those of the Indus Civilization.[33] Now, more seals of the same category, which are neither wholly Mesopotamian nor Indus in character, have been discovered at Bahrain, Failaka and elsewhere on the Arabian side of the Gulf. Contrary to the familiar shape of the Indus seals, which are mostly square, the 'Persian Gulf Seals' are circular, like those of the post-Indus (Jhukar) occupation levels at Chanhu-daro, and one reported from the surface of Lothal, a Harappan

30 This subject has been discussed by many scholars. F.A. Khan, *The Indus Valley and Early Iran* (Karachi, 1964). New evidence with further bibliographical references to various aspects of the subject are in G.F. Dales, 'Of Dice and Men', *Journal of the American Oriental Society* (New Haven, 1968), Vol. 53, pp. 15-23. The most recent researches include, E.C.L. During Caspers, 'New Archaeological Evidence for Maritime Trade in the Persian Gulf during the Later Protoliterate Period, *East and West* (Rome, 1971), Vol. 21 (1-2), pp. 21-44; *Idem*, Etched Carnelian Beads, *Bulletin of the Institute of Archaeology* (London, 1972), No. 10, pp. 83-98 with exhaustive bibliographical notes; and Edith Porada in *Artibus Asiae* (Ascona, Switzerland, 1971), Vol. 133(4), pp. 323-337.

31 M. Mallowan, 'The Mechanics of Ancient Trade in Western Asia', *Iran* (London, 1965), III, pp. 1-9; C.C. Lamberg-Karlovsky, Trade Mechanisms in Indus-Mesopotamian Interrelations, *Journal of the American Oriental Society* (1972) Vol. 92(2), pp. 222-229; and Jimmie G. Shaffer, *Prehistoric Baluchistan*: *A Systematic Approach*. Ph. D. Thesis, University of Wisconsin, 1972 (MSS), pp. 169-249.

32 The latest summary of various opinions with further bibliography by Edmond Sollberger, 'The Problem of Magan and Meluhha', *Bulletin of the Institute of Archaeology* (London, 1970), Nos. 8-9, pp. 247-250.

33 In *Proceedings of the British Academy* (London, 1932), Vol. 18, pp. 3-22.

port-city in Saurashtra. It may be recalled that both Lothal and Chanhu-daro have also produced convincing evidence of a local bead-making industry.[34]

Another denominator of Indus contacts with neighbouring lands is a class of steatite vessels carved on the outer surface with a variety of hut, matt, animal and other designs. Their widespread distribution in the ancient Near East and their parallels with a fragment from an 'early' level of Moenjodaro were summarized by F.A. Durrani some years ago.[35] In recent years, however, new field-work, done in the adjoining regions, has produced a wide range of carved vessels of stone, and thus suggests a wider geographical range of Indus contacts than was known previously. Further evidence comes from Shahdad in Dasht-i-Lut and Tepe Yahya in Iran, Tarut and Umm an-Nar respectively, off the coast of Saudi Arabia and Abu Dhabi, while similar designs, copied on grey pottery, are reported from Shahr-i Sokhta in Iranian Siestan, Bampur and related sites in southeastern Iran, Hili and Umm an-Na .[36] The carved steatite vases are now securely dated at the newly excavated sites and are mostly assigned to the Mesopotamian Early Dynastic I-III period and even earlier, consistent with the evidence of Indus-Mesopotamian contacts existing during the third millennium B.C. Likewise, the evidence of distinctive 'Persian Gulf Seals' would corroborate the documentary evidence indicating a flourishing sea-borne trade with Mesopotamia during the Ur III and Isin-Larsa period, ending around 1900 B.C.

Along with new evidence, research is now also oriented towards explaining or understanding the mechanism of East-West trade both by sea and overland routes. From the most recent evidence, it would appear that the early third millennium B.C. was a period of great cultural interaction among the populations of the Greater Indus Valley, Baluchistan, Iran and southern Mesopotamia. Sometime in the early second millennium B.C., contacts through overland routes were mostly disrupted and diverted to the sea-route via Dilmun. It is also being argued that the evidence of direct overland trade or contacts between the Indus Civilization and Mesopotamia is slight. Whatever tangible evidence is available does reflect an indirect exchange of certain specific items. On the other hand, in a recent reanalysis of the archaeological evidence pertaining mostly to the third millennium B.C., there appear to be strong links among the cultures of the Indus Valley, northern Baluchistan and regions beyond including southern Afghanistan and Turkmenia.[37] The intermediate region of central and southern Baluchistan is most likely to shed more light on the nature, duration and mechanism of Indus-Mespotamian relations and contacts with the cultures of Iran. In this context, the decipherment of the enigmatic Indus script engraved on thousands of stamp seals could be substantially helpful. The attempts made so far by many

34 Mackay, *Chanhu-daro Excavations*, 1935-36 (New Haven, 1943), pp. 186-210; S.R. Rao, 'Further Excavations at Lothal', *Lalit Kala* (1962), No. 11, p. 87.

35 Farzand A. Durrani, 'Stone Vases as Evidence of Connection between Mesopotamia and the Indus Valley', *Ancient Pakistan* (Peshawar, 1964), No. 1, pp. 51-96.

36 Grace Burkholder, 'Steatite Carvings from Saudi Arabia', *Artibus Asiae* (1971), Vol. 33(4), pp. 306-322; and Edith Porada, 'Comments on Steatite Carvings from Saudi Arabia and Other Parts of the Ancient Near East', *Loc. cit.*, pp. 323-331. Also E.C.L. During Caspers, ' A Note on the Carved Stone Vases and Incised Greyware', in B. deCardi, 'Excavations at Bampur: A Third Millennium Settlement in Persian Baluchistan, 1966', *Anthropological Papers of the American Museum of National History*, Vol. 51 pt. 3. (New York, 1970), pp. 319-325.

37 M.R. Mughal, *op. cit.*, pp. 311-323 and Fig. 16, p. 344; G.F. Dales, 'Archaeological and Radiocarbon Chronologies for Protohistoric South Asia, in *South Asian Archaeology* (London, 1973), pp. 157-169; V.I. Sarianidi, 'North Afghanistan in the Bronze Age Period', *Afghanistan* (Kabul, 1971), Vol. 24 (2-3), pp. 26-38 and *Idem.*, 'Southern Turkmenia and Northern Iran: Ties and Differences in Very Ancient Times', *East and West* (Rome, 1971), Vol. 21(3-4), pp. 291-310; and V.M. Masson and V.I. Sarianidi, *Central Asia: Turkmenia before the Achaemenids* (London, 1972), pp. 94-96.

scholars have not succeeded in breaking the code. [38]

Regarding the time-range covered by the Indus Civilization, especially the mature period as known at Moenjodaro and Harappa, it remained fashionable for a long time to impose a Mesopotamian chronology on the Indus Valley based on stylistic parallels of material objects found at both places or elsewhere in the Iranian plateau. In recent years, most of the initial problems of doubtful stratified contexts of comparable materials have now been overcome by fresh evidence from new excavations, which are usually carried out carefully under closely observed conditions. But the relative chronology worked out by comparisons with distant lands cannot be regarded as a precise and useful frame of reference. In the absence of dated and documentary evidence from the Indus Valley and on account of the fact that the Indus script is still undeciphered, internal chronologies of the cultures in the Indus Valley, and of other South Asian sites, have not yet been properly reconstructed for understanding the developmental sequence of the material culture.

With the introduction of the C-14 method of dating charcoal, bones and shell since the 1950's, radiocarbon dates are being eagerly sought and used—sometimes without caution and subjectively—for determining the absolute chronology of a given site. Initially, C-14 dates did not fit into the historical dates derived from astronomical information, especially in Mesopotamia and Egypt. It was noted that C-14 dates of the third and second millennia B.C. time-ranges were consistently later than the calendrical dates. The radiocarbon method itself has since been further developed and refined. The most recent correction proposed by the scientists for the already available radiocarbon dates seem to correspond with the archaeological dates, as the recent reappraisal of the C-14 dates from South Asia by G.F. Dales clearly demonstrates. It must, however, be admitted that the number of dates available from the Indus Valley are few. Kot Diji was the first South Asian site to be dated by the radiocarbon method. Seven dates from Moenjodaro come from the upper levels only. Kalibangan is an exceptional site, from where thirty carbon-14 dates are available. A sufficient number of dates should be available from other Indus Civilization sites to enable us to determine the life span of each city and for the solution of other chronological problems.

These are, in brief, the main features of research done on various aspects of the Indus Civilization during the last fifty years. Our knowledge of this Civilization has substantially increased; but, as pointed out at the beginning, we have yet to learn a great deal more about it. We still are unable to read the Indus script, and we do not have sufficient evidence to reconstruct those circumstances which produced urbanization in the Indus Valley. The total number of Indus settlements is also not known. In fact, many generations of archaeologists, working in close collaboration with anthropologists and specialists in many other disciplines, are needed to unravel those aspects of this highly evolved civilization which have eluded us for half a century.

In conclusion, it should be added that Moenjodaro is the largest of all the known cities

38 Scholars in different parts of the world are still trying to decipher the Indus script. For an appreciation of problems involved and methodology adopted, Ahmad Hasan Dani, *Indian Palaeography* (Oxford, 1963); Shirley Blancke, 'Initial steps in a possible decipherment of the Harappan script', in W.A. Fairservis, *The Roots of Ancient India* (London, 1971), pp. 419-424. The Soviet and Scandinavian teams have been especially engaged to break the Indus Code with varying degrees of success. The initial attempts have been given in the *Scandinavian Institute of Asian Studies*, Special Publications, Numbers 1 & 2 (1969) and 3 (1970), superseded by *Materials for the Study of the Indus Script* (Helsinki, 1973) with further bibliography.

of the Indus Civilization. It is located in that part of the Indus Valley which may have been the core area of this civilization. Therefore, Moenjodaro possesses great promise of yielding clues to the early or formative phases of the Indus Civilization, but much depends upon whether the existing ground water-table can be lowered sufficiently to permit us to reach the earliest settlement, now unhappily submerged.

Appendix
RADIOCARBON DATES
(Calculated on half-life of 5730 years)

Site	*Published dates*	*Laboratory Number*	*Readjusted with MASCA Corrections*
MOENJODARO			
	2083±66 B.C.	(P-1179)	2583 B.C.
	2062±66 B.C.	(P-1177)	2562 B.C.
	1993±63 B.C.	(P-1180)	2393 B.C.
	1967±61 B.C.	(P-1178A)	2367 B.C.
	1966±61 B.C.	(P-1176)	2366 B.C.
	1964±65 B.C.	(P-1182A)	2164 B.C.
	1760±115 B.C.	(TF-75)	2060 B.C.
KOT DIJI (Kot Dijian levels)			
Citadel, Lower level (14)			
	2605±145 B.C.	(P-196)	3155 B.C.
Citadel, Upper level (4)			
	2090±140 B.C.	(P-195)	2590 B.C.
Lower City, level (5)			
	2335±155 B.C.	(P-179)	2885 B.C.
Lower City, level (5)			
	2255±140 B.C.	(P-180)	2805 B.C.
AMRI (Amrian levels)			
Mound A, layer (19), Period IC			
	2670±113 B.C.	(TF-863)	3320 B.C.
Mound A, layer (28c), Period IB			
	2900±113 B.C.	(TF-864)	3600 B.C.
GOMAL VALLEY			
Gumla, early level of Period II			
	2248±74 B.C.	(P-1812)	2798 B.C.
Hathala, layer (2)			
	2214±62 B.C.	(P-1813)	2714 B.C.
QUETTA VALLEY			
Kile Gul Mohammad I			
	3688±85 B.C.	(P-524)	4388 B.C.
II			
	3468±82 B.C.	(UW-61)	4168 B.C.
Damb Sadaat I			
	2510±70 B.C.	(UW-59)	3060 B.C.
II			
	2559±202 B.C.	(P-522)	3109 B.C.
	2200±76 B.C.	(P-523)	2700 B.C.
III			
	2200±160 B.C.	(UW 60)	2700 B.C.
KALIBANGAN-I (Kot Diji-Sothi Culture)			
	2370±115 B.C.	(TF-155)	2920 B.C.
	2294±110 B.C.	(TF-157)	2844 B.C.
	2263±90 B.C.	(TF-241)	2813 B.C.
	2108±100 B.C.	(TF-162)	2608 B.C.
	2098±100 B.C.	(TF-161)	2598 B.C.
	1964±100 B.C.	(TF-165)	2364 B.C.
	1902±105 B.C.	(TF-156)	2302 B.C.
	1825±110 B.C.	(TF-154)	2125 B.C.

Kalibangan (Harappan Culture)

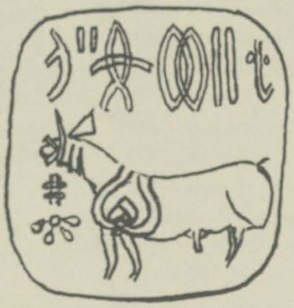
2232±100 B.C. (TF-160)	2782 B.C.
2227±113 B.C. (TF-942)	2777 B.C.
2098±124 B.C. (TF-607)	2598 B.C.
2095±115 B.C. (TF-25)	2595 B.C.
2077±113 B.C. (TF-608)	2577 B.C.
2077±110 B.C. (TF-153)	2577 B.C.
2077±100 B.C. (TF-163)	2577 B.C.
2062±103 B.C. (TF-145)	2562 B.C.
2045±75 B.C. (P-481)	2445 B.C.
2031±103 B.C. (TF-147)	2431 B.C.
1980±103 B.C. (TF-948)	2380 B.C.
1974±108 B.C. (TF-605)	2374 B.C.
1964±103 B.C. (TF-151)	2364 B.C.
1939±103 B.C. (TF-139)	2339 B.C.
1920±88 B.C. (TF-947)	2320 B.C.
1902±103 B.C. (TF-150)	2302 B.C.
1866±110 B.C. (TF-141)	2166 B.C.
1835±140 B.C. (TF-149)	2135 B.C.
1794±100 B.C. (TF-142)	2094 B.C.
1774±85 B.C. (TF-152)	2074 B.C.
1763±103 B.C. (TF-946)	2063 B.C.
1665±110 B.C. (TF-143)	1865 B.C.

Lothal (Harappan culture)

2082±130 B.C. (TF-136)	2582 B.C.
2010±115 B.C. (TF-22)	2410 B.C.
2005±115 B.C. (TF-27)	2405 B.C.
1995±125 B.C. (TF-26)	2395 B.C.
1902±110 B.C. (TF-110)	2302 B.C.
1900±115 B.C. (TF-29)	2300 B.C.

Lothal (Late Harappan culture)

1865±110 B.C. (TF-23)	2165 B.C.
1810±140 B.C. (TF-19)	2110 B.C.





DISTRIBUTION OF THE INDUS CIVILIZATION SITES

SETTLEMENTS OF THE INDUS VALLEY CIVILIZATION (1973)

(Refer to Maps on P. 38 and P. 56)

1. Mundra
2. Navinal
3. Madeva
4. Todio
5. Naliya
6. Anjar
7. Kotada
8. Buj
9. Kotada Bhadli, I,II&III
10. Nakhtarana
11. Desalpur
12. Narapa
13. Vada (Vigodi)
14. Lakhapat
15. Luna
16. Banni
17. Kotara
18. Nenu-ni-Dhar
19. Kotadi
20. Moruo
21. Kerasi
22. Surkotada
23. Selari
24. Rapar
25. Pabunath
26. Lakhapar
27. Kanth Kot
28. Khari-ka-Dhanda
29. Pirwada Khetar
30. Jhangar (Kutch)
31. Phala
32. Lakhabawal
33. Amra
34. Gop
35. Kindnarkhera
36. Somnath
37. Kanjetar
38. Veniavadar
39. Rojdi
40. Adkot
41. Bhimpatal
42. Babarkot
43. Rangpur
44. Devaliyo
45. Chachana
46. Goni
47. Pansina
48. Lothal
49. Koth
50. Nanasutaria
51. Mehgam
52. Telod
53. Bhagatrav
54. Gharo Bhiro
56. Amilano
57. Pir Shah Jurio
58. Nel Bazar or Allahdino
59. Goth Hassan Ali
60. Bala Kot
61. Gujo
62. Sotka Koh
63. Dasht-I
64. Sutkagen-dor
65. Shahjo
66. Karchat
67. Dhal
68. Amri
69. Chanhu-daro
70. Damb Buthi
71. Gorandi
72. Ghazi Shah
73. Lohri
74. Ali Murad
75. Pandi Wahi
76. Lohumjo-daro
77. Judeirjo-daro
78. Pathani Damb
79. Gand Damb
80. Kirta
81. Quetta Miri
82. Kaonri
83. Dabar Kot
84. Periano Ghundai
85. Rahman Dheri
86. Gumla
87. Katpalon
88. Nagar
89. Rupar
90. Bara

91-110. 20 or more sites in Bikaner (India) in the Sutlej, Sarasvati-Drishadvati valleys.

111-135. 25 or more sites in Bahawalpur along dried bed of Ghaggar-Hakra.

136. Kotasur
137. Vainiwal
138. Alamgirpur
139. Moenjodaro
140. Kot Diji
141. Harappa
142. Chak Purbane Syal
143. Jhukar
144. Naru Waro Daro

(The above list does not include many unpublished sites in Bahawalpur, East Punjab, Gujrat and in Sibi district, Baluchistan.)

Discussion on the Pilot Paper[1]

M. R. Mughal: Work on the study of the Indus Valley Civilization begins with the excavation of Moenjodaro and Harappa. While these excavations were in progress, efforts were made to locate other sites of the same culture. Accordingly, parts of eastern Sind were surveyed by Mr. N. G. Majumdar between 1928 and 1931. During his survey, a number of sites were explored, including a few representing the Harappan culture. Later on, the central part of the Indus Valley, covering the areas of Bahawalpur and Rajasthan, were explored and over one hundred sites were located. Unfortunately, the full report of those discoveries remained unpublished. The survey, however, indicated that the central Indus Valley possessed numerous settlements of the Indus Valley Civilization, some of which were of an even earlier date. After Independence, the principal sites of the Indus Civilization—Moenjodaro and Harappa—became part of Pakistan. Nothing was left within Indian territory, except a few minor sites near the borders of Pakistan. This situation prompted Indian archaeologists to carry out an intensive survey of various areas in East Punjab, Kutch and Saurashtra.

Recently, Professor A. H. Dani and his colleagues, Mr. Farid Khan and Mr. F. A. Durrani, surveyed some areas of the Dera Ismail Khan District. The occurrence of numerous sites of Harappa culture in the area of the Gomal Valley was surprising. Similarly, in the southern parts of the Indus Valley, some sites were known to exist, but they had not been properly studied and reported. Last year, Mr. Mohammad Sharif of the Department of Archaeology conducted a survey of the southeastern part of Sind and mapped over one hundred sites, some of which were of the Indus Civilization period. Among these was the site of Gharo Bhiro, discovered for the first time, located on the route leading southwards to Saurashtra and Kutch. Besides, several sites have been located around Karachi and in the southern part of the Lasbela District by Mr. Abdul Rauf Khan of Karachi University. Last year, a team from the Department of Archaeology headed by myself surveyed the northern part of Baluchistan which led to the discovery of three new sites. The total picture which emerges from these researches reveals at least one hundred and forty four sites of the Indus Civilization.

But it must be emphasized that it was only a part of the total picture, since large areas of this Civilization, especially in Pakistan, still remain to be surveyed systematically. There are still gaps, especially in Sind and the Punjab. There is a concentration of sites in the central part of the Indus Valley in Bahawalpur, where at least 42 sites are located, but these have to be verified by actual field work. Similarly, the discoveries made on the Indian side indicate the geographical expansion of this Civilization. It is in this context that the Civilization has also been referred to as the *Greater Indus Valley Civilization*, which embraces the river systems of the Indus and the Ghaggar-Hakra. The few sites located in the Baluchistan hills are confined to the hilly borders or are situated at strategic points on the main overland routes. For example, we have the site of Pathani Damb located on the Mula River in upper Sind. Another site, Gudri, is located in the Bolan Pass itself. The site of Dabar Kot in the Thal plain of Central Baluchistan has now for long been known to us as the most promising site, standing to a height of 113 feet in the Loralai Valley. Dabar Kot and the most recent discovery of Kaonri in Loralai are located on the ancient line of communication leading to southern Afghanistan.

1 The Editor acknowledges the assistance of Dr. M.R. Mughal in the preparation of the text of these discussions.

Another site, Periano Ghundai, is located in the Zhob Valley of northern Baluchistan, which ultimately joins the Gomal Pass. The Gomal Valley in Dera Ismail Khan district also contains several sites of the Indus Civilization. This distribution of sites indicates that the Indus Civilization covered a larger area than any of the known civilizations of the ancient world.

Here, a few words about the terminology that archaeologists have adopted for the Indus Valley Civilization are necessary. It is a general practice to name a culture after the site where it is first discovered. Accordingly, the Indus Civilization is called the 'Harappa Culture' because this civilization was first found at Harappa. However, this terminology is not fully applicable to this case, because the most important sites are located in the Greater Indus Valley proper, that is in the vast plain of the Indus and Ghaggar-Hakra river system. There are no doubt many sites located in Kutch. But the Rann of Kutch itself is formed by and is located in the Indus deltaic region. Further, the term 'Harappa Culture' focuses our attention on a particular site of this wide-spread civilization. Therefore, besides geographical considerations, there are cultural reasons to call it the Indus Civilization, implying the highly evolved stage of cultural development.

MORTIMER WHEELER: The Indus Valley Civilization covered an area roughly twice the size of ancient Egypt, and, indeed, Mesopotamia or Iraq. It is the largest mature civilization known to us. That is one of the obvious reasons for its importance.

G. F. DALES: But how much do we know about the contemporary Indian sites? In fact, it was a huge area which was occupied at the same time; and it seems that there was a shift of population from one to another site.

M. R. MUGHAL: The distribution of the Harappan sites, at first, gives an impression of an Indus 'Empire', encompassing Pakistan and the western part of modern India. However, such an impression would be misleading, because we have yet to determine how many Harappan settlements were contemporary with each other at one specific time.

S. A. NAQVI: We have worked out plans to survey the entire archaeological wealth in Pakistan. The work has been started last year by various teams. The provinces of Pakistan have been divided into various convenient components for the purpose of this survey. Last year, we carried out a survey of some of the northern parts of the Punjab, northern Baluchistan and southern parts of Sind. The leaders of these exploratory teams were Mr. Ahmad Nabi Khan, Dr. M. R. Mughal and Mr. M. Sharif. These surveys have collected some very useful data, which, when studied properly, will be of great value in solving various problems not only relating to the Indus Civilization, but also to the periods preceding and succeeding it. In fact, we have to comb the whole area of Pakistan for this purpose; and when this has been done—and I am certain that it will be done in near future—the problems raised by Dr. Dales, will be solved adequately.

M. R. MUGHAL: Concerning the question raised by Dr. Dales, we have already some evidence to believe that the sites located in Saurashtra and Kutch represent a later movement of the people from the Indus Valley, that is, from Moenjodaro. We are still not sure about the circumstances responsible for such a migration and about what happened to the principal cities of the Indus Civilization. To solve these problems, we need further excavation at various sites.

MORTIMER WHEELER: This obviously needs—under happier conditions—close collaboration with the Indian surveyors who are, after all, working on similar problems.

S. A. Naqvi: It is not only on the other or eastern side of Pakistan that we have got potential sites of this culture. Our work in Baluchistan, for instance, has indicated that its roots go deeper into the areas which are now part of Iran; and efforts are to be made to develop collaboration with Iranian archaeologists as well. With this collaboration, I am sure, we will be able to work out more details of cultural influences and contacts.

F. B. Bagherzade: May I instantly respond to the very kind remarks coming from Pakistani friends, rather an appeal for collaboration and co-operation with Iranian archaeologists. Certainly, we could not welcome any friends with a more open heart, and we look forward to co-operating and collaborating with Pakistani archaeologists. This is not just a statement for the sake of a statement, but an open-hearted invitation; and I am very happy to announce here that Mr. Naqvi and I have agreed to work together to open a new chapter of future co-operation and collaboration between Irani and Pakistani archaeologists.

M. R. Mughal: I have discussed here the problem of the origin or beginning of the Indus Civilization, the chronology of various sites and the nature of the evidence we have got from these sites.

Mortimer Wheeler: This complicated subject is fundamental to our understanding of the Indus Civilization. The trouble began about ten years ago, when a tree called the bristlecone pine was found to have, in favourable circumstances, an unruly length of life of 4,900 years or more. It was important because, as we know, the tree-rings formed a series of more or less concentric bands which can be counted, and an approximation to a very exact date can be given to that particular tree. When this process is carried back into the fifth millennium, you can off-set the tree-ring dating with the results of the radiocarbon analysis of the same material. That was where the trouble really began. It was expected before, and it now became clear that radiocarbon was not the infallible answer to all our questions which we had hoped before. Many able scientists, particularly in the University of California, like Dr. Suess, have been working on this problem. The dates in the third millennium B. C. given by radiocarbon are sometimes considerably later than the calendar dates. For example, radiocarbon may give a date of 2500 as against the calendar date of something nearer 3000. That is why the dating of the Indus Civilization is being pushed back at a remarkable speed. In 1946, before radiocarbon came on the scene and when we had simply traditional dynastic dates to go upon, I worked out as nearly as one could in those remote days, the initial date of the Indus Civilization as about 2500 B.C. Then, along came the radiocarbon with its falsifying dates, and all of a sudden, the dates of the Indus Civilization were moved up to near 2000. You find this in quite reputable books by fairly reputable archaeologists, in which it is still stated that the Indus Valley Civilization appears to have begun somewhere around 2000 B.C. Well, I sat firm without being worried unduly, because the dynastic dates were pretty solid and reliable. Now new kinds of scientific tests are just coming to light. And really at the present time I would not be at all surprised to find one morning that the Indus Civilization began 3000 B.C. or a little bit before that. That is like driving backwards to win a race. We were third in the race twenty years ago or so; and now we are nearly level with Egypt and approaching the Mesopotamian Civilization. It is a very interesting stage in our increasing knowledge and increasing consciousness of ignorance.

F. A. Khan: What effects will the revised dates have on the chronological frameworks of both the Indus Valley and Mesopotamia?

Mortimer Wheeler: The point is that the two series of dates, which are now apparently

emerging with a certain conformity, are based on entirely different premises. The Mesopotamian dates are not based on radiocarbon at all. They are based upon dynastic and similar considerations. Therefore, we are comparing reliable dynastic dates with unreliable Carbon-14 dates.

G. F. Dales: Concerning the relationship between Mesopotamia and Moenjodaro, there are archaeological specimens which give us absolutely solid parallels. We can compare a dozen or so objects with the known context in Mesopotamia, well-dated by dynastic lists. But that does not give us the full range of the Harappan Civilization. That only gives us a point in time at which the people of Moenjodaro were in direct contact with Mesopotamia. But we know that the Harappan Civilization existed before those contacts. The new radiocarbon dates give us a longer time-span of the Indus Civilization.

Zaki Iskander: Sir Mortimer Wheeler has made us a little suspicious about radiocarbon dating. Actually, radiocarbon dating showed some differences compared with the Egyptian dates. Researches made in this connection have indicated that the difference is in part due to the magnetic changes in the meridian of the years. The corrections have been made by comparing the tree-ring dates with the C-14 dates. If we apply these corrections to the ancient Egyptian samples, the dates agree with the archaeological ones.

G. F. Dales: About the climatic change, we should no longer rely just on archaeological evidence or inference. It is a scientific age, and what we must do now is to get soil samples and profiles, and we should bring to bear all of the techniques of palynology etc. This, to my knowledge, has not been done in Pakistan as yet. It is a high priority thing that we must do. We should get soil samples from the known sites of the Indus Valley. This should be coupled with traditional archaeological research.

J. F. Van Lohizen: You mentioned that most of the sites were situated on or close to the ancient or present river beds. How about those which are not situated along the river beds? Has any one tried to find out whether they perhaps might indicate ancient trade routes, or whether a pattern of ancient trade routes emerges when we plot those sites which are not on the rivers?.

M. R. Mughal: There are some sites located on ancient or modern lines of communication, particularly in the hilly region of Baluchistan, or just guarding strategic passes like the site of Pathani Damb on the Mula Pass, which connects the upper Indus Valley with Kalat in central Baluchistan. The sites on the Mekran coast, namely Sutkegan-dor, Sotka Koh and Bala Kot and the site of Lothal in western India are located on sea-routes. There are also some sites situated at the foot of the Kirthar and Sulaiman ranges. The very location of these sites is connected with the maintenance of a sphere of interaction among different populations.

Mortimer Wheeler: The sites on the Mekran coast are on the old estuaries.

G. F. Dales: Old estuaries or on the major river courses. So they are generally associated with water.

M. R. Mughal: There is a concentration of the Harappan sites in the Gomal Valley which connects the upper Indus Valley with northern Baluchistan through the Gomal route. The sites in the Loralai Valley have already been mentioned.

Mortimer Wheeler: It will be very interesting to find out the situation on the Persian Mekran.

FARID KHAN: The environment of the Gomal Valley is very similar to that of Moenjodaro. The evidence suggests that there was no major shift in the climate.

MORTIMER WHEELER: In connection with the climate, I may mention the site of Judeir-jodaro, which is situated on the high road to Baluchistan, in an arid landscape with an annual rainfall of three to four inches only. I wonder how a city of that considerable size could have lived in that kind of a desert.

ZAKI ISKANDER: Has there been pollen analysis made to ascertain changes in climate?

FARID KHAN: I understand that Dr. Kazmi of the Geological Survey of Pakistan has done some pollen analysis which suggests that there has been no major change in the ecology of the Indus Valley.

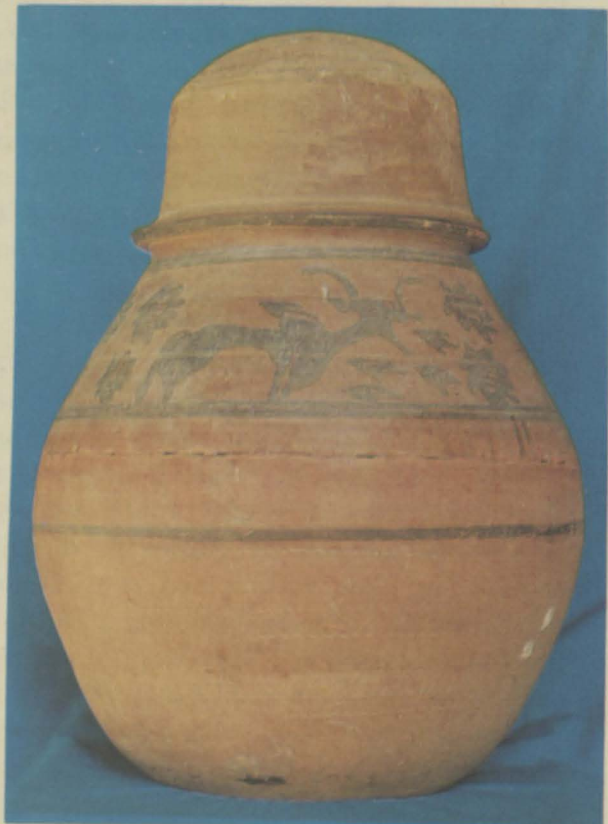
F. A. KHAN: Is there any definite archaeological evidence to prove the incoming of the Aryans in the Indus Valley?

MORTIMER WHEELER: I don't see the Aryan problem. Of course the Aryans came in: they didn't arrive but travelled in. Many years ago, when I was thinking about these things and when I began to collect data from Moenjodaro in that context, I found a whole series of groups of massacred skeletons—skeletons of people who were left lying as they had been struck down, bearing the wounds which had struck them down. After this episode, whatever it was, that part of the city where these bodies were found was deserted for a considerable time. The skeletons were lying in the position they had fallen. A friend of mine (Dr. Dales) was one of those whose own reading of the evidence upset him and he wrote an article saying there was no massacre. The only trouble was that a few days later, as he was digging here, almost on the first day of work, he came upon a pile of three skeletons lying sprawling in a lane where they were struck down. Yesterday, we were on the site where these skeletons were found, and a very interesting fact was mentioned to me, which I didn't know before: that the adjacent houses had been burnt down. So there is every circumstantial evidence for a really bad day in the life of Moenjodaro, a day which must have been pretty near the end of the city. All these skeletons are at the top level, that is, the latest level.

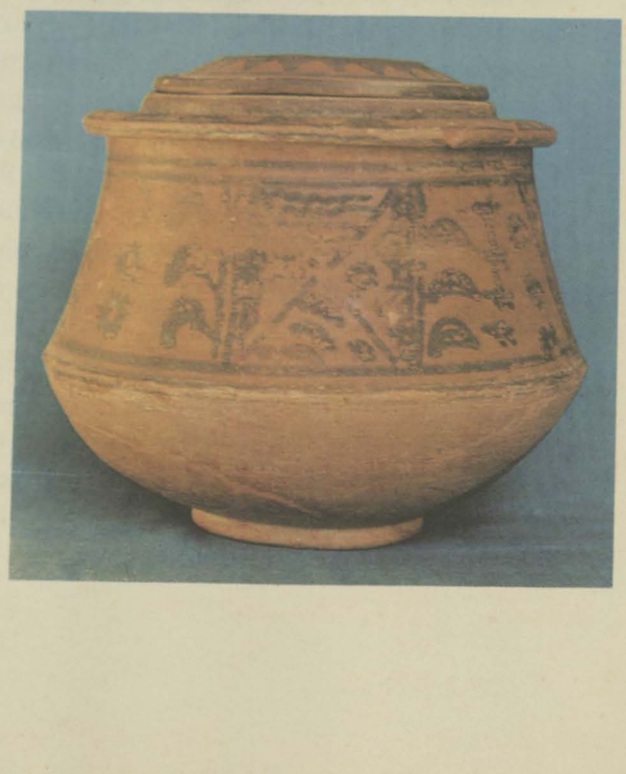
G.F. DALES: Sir Mortimer Wheeler visited the site not long after the excavations. He saw the place where the skeletons were found, and he said: "Yes, these are in a lane between brick walls, but I agree that there is no stratigraphy here. They are not on the floor or street." This was my whole basic argument for the mythical massacre of Moenjodaro. We have skeletons all over the place, but they are not found in the streets where they were slain as Sir Mortimer suggests. They are in debris and are covered by a great deal of silt, broken bricks and junk. Now, I think only two of the thirty or forty skeletons have actually been found in physical contact with the floor or on a brick staircase; the others were in the debris. There is no way of archaeologically proving that those skeletons are related to the actual last occupation of the site. That argument was based on the technique that I learned from Sir Mortimer Wheeler about the value of stratigraphic digging.

F.A. KHAN: The theory of an Aryan invasion is applied to Moenjodaro only. Is there any indication that the destruction was widespread in the Indus Valley?

MORTIMER WHEELER: If it had happened to the Harappans at Moenjodaro, there is no reason why it should also have happened to a site four hundred miles away. But if it did happen to Harappa, the Railway Engineers of 1860 very satisfactorily cleared the whole surface.



Burial jar from Harappa.



Burial jar from Harappa.

FARID KHAN: The evidence at Gumla suggests that there were two waves of invaders represented by cremation and inflexed burials. The Indus Valley phase in the Gomal Valley was destroyed by fire.

M.R. MUGHAL: Regarding the decline of the mature or urban phase of the Indus Civilization, one view is that it was possibly due to an Aryan invasion around the middle of the second millennium B.C. We have talked about the evidence of a massacre at Moenjodaro and the possible destruction of sites in the Gomal Valley. The second suggestion is put forward by Prof. Dales and Robert Raikes, who postulate a geologic uplift in the lower Indus Valley, leading to the creation of a dam across the Indus channel, near Sehwan, and a huge lake which flooded Moenjodaro and the areas around it. I have also referred to the tectonic disturbances in the Indus Valley, pointing out that this part of the valley does fall within an active seismic zone. Such a phenomenon is possible; but has not yet been proven. In this context, I might point out that during a recent survey of south-eastern Sind, Mr. Mohammad Sharif came upon some evidence of the desertion of many settlements of the late 18th and early 19th century A.D. One reason for such a large-scale abandonment of sites may have been the huge Allah Bund, which was created across the Indus River as a result of the violent earthquake of 1819. This natural phenomenon might have caused a flooding of the southeastern part of the Indus Valley, forcing the people to migrate to other areas. In 1950, Mr. M.R. Sahni, a palaeontologist, originally suggested that the decline of the mature phase of the Indus Civilization might have been due to geologic disturbances.

MORTIMER WHEELER: The story has been accepted by some, and discussed by all, that there was a geological uplift across the line of the Indus Valley below Moenjodaro, somewhere near Amri perhaps, and that ponded back the river and turned it into a great lake, flooding many buildings. You can imagine that perhaps the mounds which had grown up during the centuries, and carried various buildings of Moenjodaro, appeared as a series of little islands. Other buildings were raised on mud-brick platforms to surmount the floods. Then, as sequel to this, the river broke through the tectonic barrier on its original course, thus restoring the landscape to something approaching its previous condition.

N.A. BALOCH: Historically speaking, within this millennium, we have evidence that the cities which were flourishing until 1000 A.D. had been deserted because of the vagaries of the rivers. For example, the Arab city of Mansurah was deserted because of the change in the river course. The same geographical considerations can be applied to prehistoric times. The Indus River was not flowing by the side of Moenjodaro about 1000 years ago. At that time, it was flowing through the middle system, and not through the present western system.

F.A. KHAN: How many sites were affected by the mighty dam which is supposed to have been formed near Sehwan, and where is the evidence of it?

M.R. MUGHAL: There are real objections to this theory. It is argued that if a large area was flooded due to the creation of a huge dam, it would have flooded several large and small sites, including Moenjodaro itself. Furthermore, with the rejuvenation of the Indus channel, most of the submerged sites should have been eroded away. These objections and many others have been raised by H.T. Lambrick, who says that there is no physical evidence of any remnant of a dam anywhere in Sind: there are no butt-ends of it on either side of the river. That the site of Amri was situated near the sea-shore during prehistoric times is also questionable. If the sea had extended up to Amri, then the location of

Gujo, a site of the Harappan and of an earlier period, on the top of a hillock near Thatta cannot be explained. The inference would be that at least up to Gujo, about fifty miles east of Karachi, the lower Indus Valley was inhabited even before the time of Moenjodaro. If we postulate a dam and a ponding back of water, the sites of Kot Diji, Jhukar, Lohri Lohumjodaro, Jhangar and Bandhri etc. would have been affected by the flood. But we do not know much water had accumulated in the supposed lake and to what height. Ironically, no evidence of flooding has, so far, been found at these sites. However, there exists a new hypothesis concerning the decline of the Indus Civilization, which also involves geological disturbances as one of the factors pertinent to this problem, and which may also be considered.

G.F. Dales: Our research of 1964-65 was of a preliminary nature. The evidence we collected really applied only to the site of Moenjodaro and its decline, rather than of the whole Indus Civilization. We know nothing about the significance of Moenjodaro, whether or not the city was an administrative or religious centre. What was the impact of the desertion of the city? I would suggest that a careful survey should be done around Moenjodaro for other sites, and to obtain elevations. Without their elevations, we cannot tell how many sites were flooded. As the theory stands, it is one way to explain some of the peculiar features of Moenjodaro, like the mud-brick platforms and thick layers of silt.

Mortimer Wheeler: I know that Robert Raikes wants to bring this theory down to earth by actual probing and digging. We do have this phenomenon of massive up-building of houses and their platforms in terraces, generally, of mud-brick. It was a costly operation. It was done to build their houses above the water-level of that period, and there was a problem of water, whatever one says. It is an attempt to solve an agreed phenomenon. It is hoped that provision will be made in the near future to carry out these selective probings.

M.R. Mughal: The next point of our discussion relates to the archaeological evidence of contacts between the Indus and Mesopotamian Civilizations, and the implications of these relations with the cultures of Iran, the Persian Gulf and other regions.

Mortimer Wheeler: It is a complicated matter, but of considerable importance. A few years ago I was in Bahrain, an island and a centrepiece of this landscape of the Persian Gulf trade. The whole question of the Persian Gulf trade is of outstanding interest. Years ago, two semicoastal sites were located on the Mekran coast, lying west of Karachi, by Dr. Dales, to which a third was added by Robert Raikes. No doubt, there were several more which functioned like petrol stations on a highway. These sites do make sense in the light of a considerable trade between southern Mesopotamia at one end and the Indus Valley on the other, whatever name may be given to the latter in the collections of the museum at Yale. This reminds me that, while we spend years of our life and bags of our money in digging up sites in difficult places, the most profitable places, I think in my experience as a Trustee of the British Museum, are the cellars of our big museums. We need somebody with knowledge and the academic opportunity to continue what Dr. Dales began so well twelve years ago on the shores of the Persian Gulf, and to continue finding these service stations or ports-of-call to which the ships going up and down the Persian Gulf between the two great civilizations of Mesopotamia and the Indus called for fresh water, fresh vegetables and an interchange of goods. Failaka is a little island of the size of merely a first, located at the top end of the Persian Gulf. The Danes—if only they publish what they found—report the discovery of many seals of the sub-Indus kind.

One of the seals from Bahrain resembles the one stamped on an inscription (at Yale) bearing the name of one Hatim-Ibanum, and has been dated to the tenth year of the reign of Cungunum or 1923 B.C. S.R. Rao also found one seal at the port-city of Lothal, located on the Gulf of Cambay.

Firouz Bagherzadeh: The recent excavation carried out in Shahdad by Engineer Hakimi has revealed dozens of steatite vessels with geometric designs very similar to what you found in Moenjodaro. Another analogy is found in the glyptic art. Secondly, the occurrence of lapis lazuli at Shahr-i Sokhte in Iranian Siestan is a very interesting phenomenon. It obviously came there from Badakhshan. While prospecting westwards on the three different itineraries drawn on the map, it would perhaps be a good idea to prospect in the North-South as well from Central Asia to the shores of the Indus, and then to go westwards to the desert of Lut in Iran.

G.F. Dales: There has been a considerable amount of research and exploration in the northern region dealing with the possibility of Harappan contacts with Afghanistan and Siestan and southern Russia. I have just completed three years of work in Afghanistan on this problem, and I can assure you that there is not a shred of evidence of Indus Valley influence in Afghanistan, in Shahr-i-Sokhta, and in southern Russia. The time when we have contacts, and very close contacts, is in the early Harappan period as defined by Dr. Mughal. From ca. 3000 to 2500 B.C., you have very close contacts in terms of female figurines of the type which are being found in the Gomal Valley, in Jalilpur, and which have been reported in Afghanistan and the new sites in Soviet Central Asia. These are extremely close contacts, but these contacts absolutely stopped at the time when Moenjodaro became a mature, flourishing city. It seems to me that there is a possibility of those northern contacts having been disrupted somehow. Whether or not this had to do with the early movements of the people, we don't know. But the contacts we get during the mature Harappan period are down to the coast. These are coastal contacts, and that is why we have this series of sea-ports and the evidence of the Persian Gulf seals. We are not going to find any Harappan in Afghanistan. It is up to the historians to try to find out why there was a disruption of trade. The lapis lazuli is found during the early Harappan period, ca. 3000-2500 B.C. It does not come down to this area during the mature Harappan period.

Mortimer Wheeler: A little bit of it does.

G.F. Dales: A little bit does, but not to the degree that we find at Shahr-i-Sokhta, which is a fantastically rich site. But the lapis lazuli which we find in Siestan was going westward to Iran and Mesopotamia.

Mortimer Wheeler: Do you reject the alleged Proto-Harappan in Afghanistan?

G.F. Dales: The Proto-Harappan or Early Harappan is there, but not the Mature Harappan.

Mortimer Wheeler: Things like the Quetta ware, you get there (in Afghanistan) in a pretty big way.

M.R. Mughal: Strong contacts are noticeable between the north-eastern regions of Iran and southern Afghanistan and northern Baluchistan and the Greater Indus Valley during the early third millennium B.C., or the early Harappan period in the context of the Indus Civilization. There was considerable interaction among these regions before the mature Harappan period.

The Indus Valley Script: A Survey of Attempts for its Decipherment

Ahmad Nabi Khan

ABOUT a century ago, in 1875, Alexander Cunningham reported the discovery of a 'most curious object' which was found at Harappa by Major (General) Clark, then Commissioner of Oude.[1] It was a seal made of 'dark brown Jasper', and engraved on it was a bull, without hump, looking to the right with two stars[2] under its neck. Above the bull was an inscription engraved in six characters. Though the inscription was not intelligible to him, he nevertheless concluded that the characters of the inscription were not Indian and therefore the seal was 'foreign to India'.

This was the first discovery and reporting of a steatite seal with characteristic inscriptions destined to play an important role in the identification of the Indus Valley Civilization. About six years later, however, Cunningham changed his views and tried to decipher the script by attributing its characters to the archaic Indian letters of an early age. According to him, the letters were to be read from left to right and on the anology of Asokan characters, the inscription may be deciphered as Lachmiya.[3] He assigned the seal to a date 'not later than 500 or 400 B.C.'[4]

In 1886, another seal was reported to have been found from the same place. It was introduced by Longworth Dames, who while reporting the views of a French archaeologist, M. Terrian de la Couperie, published its facsimile along with the drawing of the earlier seal reported by Cunningham. According to this report, the seal was found at Harappa on 21 November 1884 by Mr. J. Harvey, then Inspector of Schools at Multan. The seal differed from the previous one both in size and motif, as it was oblong in shape and possessed only an inscription. It was made of a smooth stone perfectly flat on the engraved side and rounded at the back. The inscription was composed of five characters. Terrian thought that these seals were brought to India in the course of trade through Bactria, and possibly belonged to the Buddhist pilgrims who visited Harappa.[5]

A little later, in or shortly before August 1886, one more seal was 'dug up' from the mounds at Harappa by another Englishman, T. A. O'Counor, who was then serving as District Superintendent of Police. The seal was later on obtained by Longworth Dames, who presented it to the British Museum. These three

1 Alexander Cunningham, *ASIR*, Vol. 5, p. 108, pl. xxxiii, figs. 1 & 2; also *cf.* Fleet, 'Seals from Harappa' in *JRAS*, Part 2, 1912, p. 699 *sqq.*, who furnished further details about the circumstances of the discovery of the seal, and says that Major (General) Clark found it in or before 1872-73. It is now preserved in the Deptt. of British and Medieval Antiquities of the British Museum.

2 The drawing of the seal given by Cunningham is not accurate, as various inaccuracies have crept in while copying the letters of the inscription as well as the legends engraved under the neck of the bull. There are actually no traces of stars, which at best may be identified with a combination of strokes and dots.

3 Alexander Cunningham, *Corpus Inscriptionum Indicarium*, Vol. 1 (Inscriptions of Asoka) (Calcutta 1879), p. 61, pl. xxviii.

4 *Ibid.*

5 M. Longworth Dames, 'Old Seals Found at Harappa' in *Indian Antiquary*, Vol. 15-1886, p. 1, figs. 1 and 2. The drawing of fig. 2 has been printed upside-down. See also J.F. Fleet, *op. cit.*, p. 700, where more details about the discovery of this seal are recorded, which reveal that it was purchased by Mr. J. Harvey in December 1885 from a local agriculturist at Harappa.



Plate I: Indus Valley seals with script and animal figures.

Harappan seals formed the subject of an article contributed by J. F. Fleet to the Journal of the Royal Asiatic Society in 1912. While Fleet almost copied the description of Cunningham and Dames for the earlier two seals, he gave his own for the third one. He also attempted to decipher the inscription on the analogy of Cunningham's reading, and interpreted it as giving the word *Ka-lo-mo-lo-gu-ta*; but, hastened to observe: " . . . but it is hardly possible to take the inscriptions really in this way".[6] Fleet's own contribution in publishing a consolidated account of the three seals was that he published fascimiles of the two already reported seals taken by means of plaster-casts and the photograph of the third seal. This helped in correcting the inaccuracies which the earlier two writers had committed in copying the characters of the inscriptions.

The above paragraphs reveal the fact that while the seals were known to scholars since the middle of the nineteenth century, their origin, significance, and exact age remained obscure to them for quite some time. Cunningham and Fleet could only reach the conclusion that these were very old and belonged to the fourth century B.C. or "to the period of Buddha himself". Indeed, the first regular excavations at Harappa, started by Rai Bahadur Daya Ram Sahni in 1920-21 and reported by Sir John Marshall in the Annual Report, could not reveal the pre- or proto-historic nature of the site and attributed it vaguely to the pre-Mauryan epoch. However, these preliminary diggings increased the number of seals, as three more were collected from the site during the operations.[7] The same uncertain date was assigned to these seals by Sir John Marshall in his chapter on the monuments of ancient India contributed by him to the first volume of the Cambridge History of India, published in 1922. He referred to these Harappan seals rather casually, intimating that they were of unknown date and origin.[8]

While Marshall and others were attributing vague and inconclusive dates to these seals, field investigations were going on in other areas; and one year after Daya Ram Sahni's work at Harappa, similar seals were discovered by R.D. Banerji at a newly explored site named Moenjodaro.[9] It was the year 1921-22. Besides the seals, other antiquities and pottery were collected during the limited digging operations. However, the collection remained unstudied until 1924, when Sir John Marshall got an opportunity to examine it. The identical nature of material from the two sites baffled both the excavators and Sir John, who then adopted a rather ingenious method to solve the problem. Sir John himself reports: "So impressed indeed was I by their (the finds) novel character that I lost no time in publishing an account of them in the *Illustrated London News*, my hope being that through the medium of that widely read journal I might succeed in getting some light thrown on their age and character by archaeologists in other countries. This hope, I am glad to say, was at once fulfilled. In the following issue of the *Illustrated London News* appeared a letter from Professor Sayce, pointing out the close resemblance between these objects from the Indus Valley and certain Sumerian antiquities from Southern Mesopotamia, and a week later there appeared in the same Journal a longer article from the pens of Messrs Gadd and Sidney Smith, giving a more detailed comparison of pictographic scripts, and other antiquities, found in the two countries. Some of the analogies suggested by these two writers are fanciful; but most of them are undoubtedly correct, and there can now no longer be any doubt that the Punjab and Sind antiquities are closely connected and roughly contemporary with the Sumerian

6 G.F. Fleet, *op. cit.*, p. 701.

7 Sir John Marshall, *An. Rep., A.S.I.* (1920-21), pp. 16-17, pl. xiii b, c and d.

8 J. Rapson (ed.) *CHI* (Cambridge 1922), Vol. 1, p. 618, pl. xi, 22, 23. The seals illustrated on this plate have been published here for the first time, as they do not appear in the earlier *An. Reps. of A.S.I.*

9 R.D. Banerji in *An. Rep. A.S.I.* (1922-23), p. 103.

antiquities of Mesopotamia dating from the third or fourth millennium B.C. Simultaneously, the same conclusion was reached by Dr. E. Mackay, Director of the American Expedition at Kish, who in an unpublished letter to me pointed out the similarity between the ceramic wares found at Moenjodaro and at Kish, and also brought to my notice that a seal identical with those found at Harappa and Moenjodaro had been discovered in the debris beneath a temple of Hammurabi's time (c. 2100 B.C.)". [10]

The above extract reveals a few interesting points. It shows that it was through this ingenious method that Sir John was able to establish the pre- or proto-historic nature of the seals and other objects from Harappa and Moenjodaro. Secondly, the first regular, if not scientific, attempt to solve the riddle of the Indus script was made in 1924 by C. J. Gadd and Sidney Smith, both of the British Museum, who studied the script from the photographs of the seals published by Sir John Marshall in the *Illustrated London News*. And, thirdly, an identical seal was discovered from the ruins of a temple of Hammurabi's date. The last two facts have a direct bearing on the question of the study and decipherment of the Indus script. It is evident that with the establishment of links between ancient India and Egypt and Mesopotamia, mainly through their seals, a decision was taken to dig the two sites extensively.

The publication of the seals in the above-mentioned Journal aroused the interest of many archaeologists, and besides the efforts of Gadd and Sidney Smith, another orientalist, L. A. Waddell, also studied the inscriptions. The results of his studies, published in 1925, stressed links between the Harappan and Sumerian scripts, and tried to find the names of Vedic and Epic heroes in Sumerian inscriptions on the assumption that the people of Harappa and Moenjodaro were Aryans. [11]

In the same year, another article was published by a French scholar, C. Autran, who published the inscriptions of 19 seals to examine various characters of the script. This was the first article concerning the Indus Civilization published in French. Autran sought possible connections of the Indus Civilization with Asia Minor and the Aegean. [12]

Meanwhile, large-scale excavations at both the above sites yielded a rich harvest of seals, and Sir John Marshall published accounts of these regularly in the *Annual Reports of the Archaeological Survey*. These collections underwent systematic studies by Gadd, Smith and Langdon, whose contributions were to appear in the later publications on Moenjodaro by Sir John Marshall. Langdon, with his special knowledge of the Mesopotamian Civilization, tried to solve various problems connected with the decipherment of the script and other related questions, and completed his chapter on the Indus Valley script in 1928. [13] Besides, he contributed an article entitled 'A New Factor in the Problem of Sumerian Origins' to the *Journal of Royal Asiatic Society* in 1931 in which he discussed some Indus Valley seals found at Kish and the problem of their origin and their possible connection with the Sumerian people. [14] G. R. Hunter selected the subject for his dissertation to be submitted to the Oxford University for the Ph.D. degree. [15] He carried out his studies during the years 1926-29, and made an exhaustive study of the script by copying and comparing as many as 750 seals of different kinds

10 Sir John Marshall, *An. Rep. A.S.I.* (1923-24), p. 48.

11 L.A. Waddell, *The Indo-Sumerian Seals Deciphered* (London, 1925).

12 C. Autran, 'Un problem de Paleographie' in *L'illustration* (Paris, 1925) No. 4282, 28 March, p. 289.

13 *Vide* the date line in Marshall, *Moenjodaro and the Indus Civilization* (London, 1931) Vol. 2, p. 455.

14 *J.R.A.S.* (1931) p. 593 sqq.

15 The dissertation was later on published and entitled *The Script of Harappa and Moenjodaro and Its Connection with Other Scripts* (London, 1934).

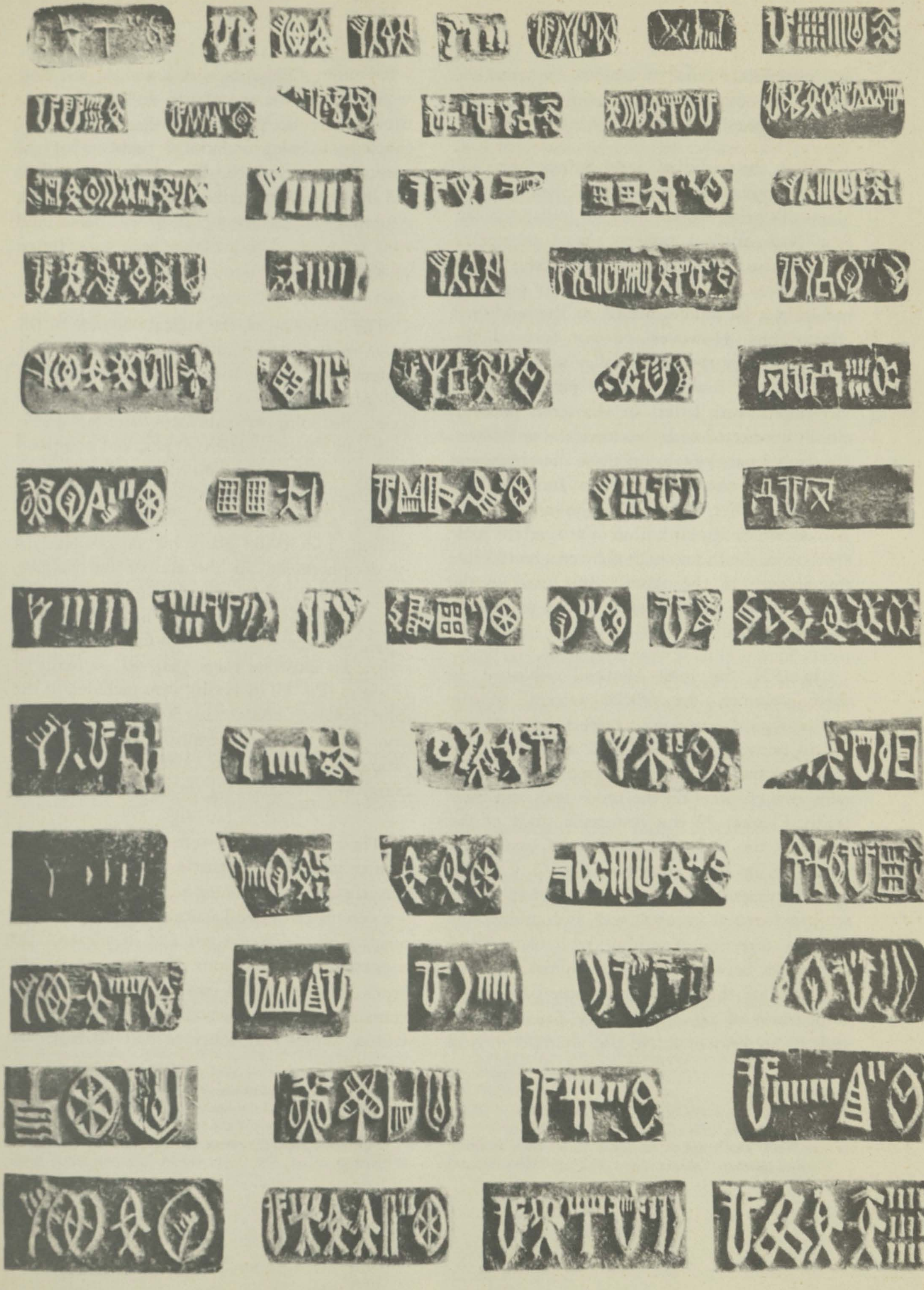


Plate II: Indus Valley seals with script, only.

and materials. According to him, the script was mainly phonetic, though its origin might have been pictographic or ideographic.[16]

While the studies of Gadd, Sidney Smith and Langdon were yet to be published fully in Marshall's proposed volumes, an Indian scholar, Pran Nath, made a rather unusual attempt to decipher the Indus script. Unfortunately, he had no access to the original collections of seals and had to base his studies mainly on the published photographs. However, he put forward the new theory that the Indus Valley script was the forerunner of Brahmi and the pictographs or ideographs were letters or characters (*akṣaras*) closely connected with the characters of Brahmi. He also prepared a table of these characters, and with its help tried to read a few Indus inscriptions.[17] Earlier, he had suggested that the strokes which appear within or around the main symbols of the Indus script showed a remarkable resemblance to the vowel signs used in the earlier Brahmi writing of southern as well as northern India.[18]

In 1931, Sir John Marshall published, in three volumes, the official account of the archaeological excavations carried out at Moenjodaro between the years 1922 and 1927. The second volume of this monumental work contains two chapters on the Indus seals and their script. Chapter 22 is a systematic study of the signs on the seals and consists of two parts. Part One has been contributed by C. J. Gadd, who discusses the nature of the script and deals with its external features, such as combinations of signs, direction of writing, resemblances and similarities between Indus and Sumerian signs, analogies of the Indus and Sumerian scripts, comparison of signs with those found on the seals of Mesopotamia. He also attempts to read a few inscriptions, but with a note of warning, which admits the speculative and presumptive nature of the decipherment.[19] Part Two of the chapter, analysing individual elements of the script, gives various classifications of signs, ends and beginnings, numerical signs, strokes at the beginning or end of symbols, proper names and other elements. This part has been contributed by Sidney Smith.

The next chapter, the logical outcome of the above studies, was contributed by S. Langdon, Professor of Assyriology at the University of Oxford. It discusses various aspects of the script, including resemblances between Indus signs and Egyptian Hieroglyphs, and compares the signs of the Indus and Mesopotamian seals. Like Pran Nath, Langdon also suggests that the Brahmi script was derived from the Indus writing, and finally offers his suggestions for its decipherment. At the end of the chapter, there are two tables, the first giving a list of Brahmi characters derived from the Indus script, and the second a sign-list of the Indus script. To illustrate these chapters, as many as 17 plates (Pls. cii to cxviii) were included in the third volume, containing 560 inscriptions on stone seals and 59 inscriptions on sealings of various materials, while 11 plates (Pls. cxix to cxxix) were reserved for the sign manual.

These two chapters were reviewed by G. R. Hunter in a detailed article contributed to the *Journal of the Royal Asiatic Society,* which pointed out certain errors and inaccuracies in the compilation of tables of signs and in some of the suggested interpretations. At the end of the article, Hunter added two appendices, the first containing a more methodically arranged list of words, names and concepts derived from the

16 *Ibid.,* p. 12 *sqq.*

17 Pran Nath, 'The Script of the Indus Valley Seals' in JRAS, 1931, p. 671 sqq. (Miscellaneous communications).

18 Pran Nath 'The Script of the Indus Valley Seals' in *Indian Historical Quarterly*, Calcutta, Vol. 1 (1929), p. 2. He continued his studies on the subject and contributed a series of articles to various issues of the *Illustrated Weekly of India* appearing in 1935 (7 and 21 July, 4 and 18 August, 8 and 22 September, 13 October, and 3 December).

19 Marshall, *op. cit.,* Vol. 2, pp. 413-14.

seals, and the second a sign-list.[20]

Not long after the publication of G. R. Hunter's thesis, another study on the Indus script was published by P. Meriggi. His long article studies various aspects of the subject, and concludes that the script was ideophonographic and had a close resemblance with the Hittite hieroglyphic script. According to his interpretation, the script has few signs for verbs but many for nouns. According to him, the seals were used for administrative purposes.[21]

Besides these scholars, a group of Hindu scholars in India attempted to decipher the script in Sanskrit. One of these scholars, Swami Sankrananda, who was a Tantric student, tried to solve the riddle with the help of Tantrism.[22] His theory was later on adopted and modified by B.M. Burua[23], who also suggested that the Indus Valley script could be deciphered with the help of Tantric texts. A.P. Karmarkar, basing his theory on the same assumption, similarly attempted to decipher the script in Sanskrit.[24] He argued that the Indus Valley Civilization was both pre-Vedic and post-Vedic. Though it preceded the Vedic civilization and also ran parallel to it, it remained uninfluenced by it. He suggested that some of the Aryans must, however, have mixed, with the Dravidians, and that the inscriptions were the main outcome of this intermingling.

Then in 1953, a more comprehensive and systematic decipherment was published by Father Heras. Heras must have been studying the subject for quite some time. His monumental volume traces and analysis all the previous work done in the field, and weighs its merits and demerits in order to build up his own theory. In a long introduction, he explains the general principles on which he bases his method of decipherment, and then classified all the signs in various categories, such as pictographs, phonetic signs, compound signs, phonetic combinations of signs, etc. He also discusses internal and external peculiarities of the script. He devised numerous tables and charts to attempt the decipherment, and with the help of these, he claimed that he had deciphered the script successfully.[25]

Meanwhile, some literature on the script appeared in Urdu and Sindhi as well. While Siddiqi summarized previous attempts in one of the chapters of his book,[26] Abu Jalal Nadvi tried to identify it with ancient Arabic.[27] A.H. Dani, after summarizing the earlier efforts, devises yet another method to read the script. The groups of signs arranged by him are based on stylized living beings, objects which are easily recognizable, symbols having geometrical forms—such as ovals, triangles, quadrangles, angles, crosses, etc—, complicated symbols, and strokes horizontal, vertical, or starting, etc. Then follows a detailed discussion which ends with the following observation: "But nothing definite can be asserted in the present state of the materials. One thing is certain that the Indus script, in its ultimate analysis, is not very complicated."[28] This study was followed up by S.K. Ray, who contributed another thesis on the interpretation of the Indus script. A summary of his contribution, published in

20 G.R. Hunter, 'Moenjodaro-Indus Epigraphy' in *JRAS*, 1932 p. 466 sqq.

21 P. Meriggi, 'Zur Indus Script' in *Zeitscprift der Deutschen Morgentandischen Geoelleschaft* N.F. vol. xii (1934) pp. 189-241.

22 Sankrananda, *The Rigvedic Culture of the Pre-historic Indus.*

23 B.M. Burua, 'The Indus Script and the Tantric Code', in *Indo-Iranica,* Vol. 1 (July 1946), pp. 15-21.

24 A.P. Karmarkar, 'The Aryo-Dravidian Character of the Moenjodaro Inscriptions' in *Pracyvarni* (Calcutta) I, pp. 99-101.

25 H. Heras, *ap. cit.*

26 M. Idris Siddiqi, *Wadi-e-Sindh ki Tehzib* (Urdu), (The Indus Valley Civilization), (Karachi, 1959).

27 He also wrote in Urdu. His lengthy article entitled 'Qadim Muhren' (Ancient Seals) was serialized in the *Mah-i-Nau*, Karachi, August, September, October, November and December, 1956.

28 A.H. Dani, *Indian Palaeogrpahy* (Oxford, 1963) p. 19. For the summarized notices of the researches carried out by B. Hrozvy and G. de Hevesy, *see* Heras, *op. cit.*, p. 58 *sqq.*, and Dani p. 14 *sqq.*

1963, discusses "Two main principles underlying the formation of the Indus signs, viz.—(1) the accentuation of the original signs, and (2) combination of two or more signs."[29] In addition, Wheeler,[30] Piggott,[31] Mackay,[32] Vats,[33] Allchin,[34] Gordon,[35] Allan Ross,[36] and Koshambi,[37] have also alluded to the subject in several of their writings. Among these, the following observation of Sir Mortimer Wheeler is particularly apt::

> "The conditions requisite for the interpretation of the script—a bilingual inscription including a known language, or a long inscription with significant recurrent features—are not yet present. A majority of the available inscriptions are short, with an average of half a dozen letters; the longest has no more than seventeen. The variety prevents the assumption that they relate to the limited designs on the seals. It has been conjectured, with all reserve, that they may consist largely, though not entirely, of proper names, sometimes with the addition of a patronymic, a title or a trade. *We do not know*".[38]

In 1971, another attempt to decipher the Indus script was reported from the Department of Anthropology of the American Museum of Natural History. The reports of this, however, indicate that the attempt is still in its initial stage, and as yet nothing substantial has emerged.[39]

This is the substance of the efforts made by various scholars during the last one hundred years to decipher the Indus Valley script. It is evident that no conclusive solution has been offered by any of these scholars, as every new theory either contradicts a previous one or complicates it.[40] Recently, therefore, a new method utilizing computers has been adopted to decipher the signs. The first attempt of this kind was made by Russian experts, and the results of their efforts were published by the Institute of Ethnology of the Academy of Sciences, USSR.[41] The method was then adopted by some Scandinavian scholars, who have been working on the problem since 1964. The provisional results of these attempts were published in 1969 with the claim that "The secret of the Indus script has been broken, although much remains to be done before we can read all the inscriptions."[42]

With this note ends this brief survey of the present state of research on the Indus Valley script. The world of interested scholars now anxiously and hopefully await the final results of these efforts.

29 Sudhansu Kumar Ray, *Indus Script*, Memorandum No. 1 of the Indian Institute of Egyptology, New Delhi, 1963. Reviewed by A.H. Dani in *Ancient Pakistan*, No. 1, 1964, pp. 142-3.

30 Mortimer Wheeler, *The Indus Civilization* (3rd ed.), Cambridge, 1968.

31 S. Piggott, *Prehistoric India* (Pelican Books, Harmondsworth, 1950).

32 E.J.H. Mackay, *Further Excavations at Moenjodaro* (Delhi, 1938).

33 M.S. Vats, *Excavations at Harappa* (Delhi, 1940).

34 Bridges and Raymond Allchin, *The Birth of Indian Civilization* (Pelican Original, Harmondsworth, 1968).

35 D.H. Gorden, *The Prehistoric Background of Indian Culture* (Bombay, 1960).

36 S.E. Ross Allan, *The Numerical signs of the Moenjodaro Script* (Mem., A.S.I., No. 52) (Delhi, 1938).

37 D.D. Kosambi, *The Culture and Civilization of Ancient India*, (London, 1965).

38 Wheeler, *op. cit.*, p. 108.

39 Shirley Blancke, 'Initial Steps in a Possible Decipherment of the Harappan Script', Appendix J, in Walter A. Fairservis Jr., *The Roots of Ancient India: The Archaeology of Early Indian Civilization* (London, 1971) p. 419 *sqq*.

40 *Cf.* A.K. Zide, 'A Brief Summary of Work To Date on the Indus Valley Script', paper contributed to the Chicago Linguistic Society, (April 19-20, 1968) p. 225 *sqq*.

41 Y. Knorosov, *A Brief Report on the Investigation of the Proto-Indian Texts* (Russian), Moscow, 1968; A.K. Zide and K. Zuelebil. *The Soviet Decipherment of the Indus Valley Script*. (Translation and Critique), 1972.

42 Asko Parpola and others, *Decipherment of the Proto-Dravidian Inscriptions of the Indus Civilization* (first announcement), Special Publication No. 1 of the Scandinavian Institute of Asian Studies (Copenhagen, 1969), p. 50. Later announcements of the authors show that the work is apparently achieving some positive results. Two more Information brochures have appeared since the publication of the above monograph.

The Indus Valley Script on Punch-Marked Coins

Taswir Husain Hamidi

THE enigmatic Indus Valley Script is yet to be deciphered and read. The attempts, including a recent one by Swedish scientists, have so far remained inconclusive.[1] Is the script pictographic or ideographic?[2] Do the inscriptions represent a word or a sentence? Do the characters of the script have any phonetic values? How did this script originate? Was it indigenous in origin, or was it imported from outside? Through what process did the script evolve and reach its present form? What impact, if any, did it leave on the later scripts of the Subcontinent, and did it continue in any modified shape or form after its mother civilization came to an end? These and many other questions like them crop up in our minds and yet remain to be answered.

Almost all the scholars who have worked or are still working on the Indus Valley Script have mainly concentrated on sources from which this script might have been derived; but very few serious attempts have been made to follow it through the stages it traversed and to determine whether it died out with the collapse of the Civilization or not, what happened to it.[3] This paper attempts to indicate a line of study from this point of view.

An amazing peculiarity of the Indus Civilization is the long life of its traditions, some of which still continue in certain areas.[4] Potters in the adjoining villages of Moenjodaro still make the same types of pottery as their counterparts used to make during prehistoric days. Womenfolk in the neighbourhood of Moenjodaro wear ornaments very similar to those of their ancient sisters and mothers, heavily loaded tiny bullock carts are still seen throughout Sind, and present an astonishing resemblance to those fashioned in terracotta by Moenjodaro toy-makers.[5] Although we do not have any remains of an actual bullock cart from Moenjodaro, it is almost certain that the toy bullock-cart presents a model of it.

Remains of the Indus Valley script have come to us in a similarly indirect manner. A close study of South Indian scripts, such as Tamil, Telegu and Malyalam, suggests that all these Dravadian scripts are most probably the by-products of the Indus writing.[6] Symbols impressed on punch-marked coins retain quite a few signs and devices typically Harappan in character and some of them are, in fact, exact copies of the symbols engraved on the Indus seals, tablets, pottery, stamps and graffito. This

1 *Cf.* Ahmad Nabi Khan, 'The Indus Valley Script: A Survey of Attempts for its Decipherment', p. 67 sqq.

2 David Diringer, *Writing,* (London, 1962) p. 65.

3 The theories regarding the end of the Indus Civilization propounded by Marshall, Mackay, Wheeler and Piggot may have to be modified and revised in the light of the results obtained from Radiocarbon 14 tests. For a list of these dates, *see* Bridget and Raymond Alchin, *The Birth of Indian Civilization* (Pelican Original: Harmondsworth, 1968).

4 The resemblance of seal and coin-symbols has been noticed by Mackay, Gadd and Langdon in Marshall's *Moenjodaro and the Indus Civilization*; also by Pran Nath in *JRAS* (1931), in the *Indian Historical Quarterly,* vol. vii (1931) and vol. viii (1932); by Durga Prasad in *Journal and Proceedings of the A.S.B.* (N.S., vol. xxxi, 1934) *Numismatic Supplement* xiv; and by K.N. Dikshit in his address to the Numismatic Society of India (Allahabad, 1934); by C.L. Fabri in *JRAS* (1935); and by E.H.C. Walsh, *Punch-Marked Coins from Taxila,* (Mem. A.S.I. No. 59). (More recently, a synthesis of these views has been presented by Prof. Dani in his *Indian Palaeography,* App. to Chapter 2, p. 20 sqq.—Editor).

5 A visit to Meonjodaro's neighbouring village of Hassan Wahan, or for that matter to any village in Sind, would reveal this fact abundantly.

6 E.H.C. Walsh, 'Two Hoards of Silver Punch-Marked Coins Found in the Bhir Mound at Taxila' in John Marshall, *Taxila* (Cambridge, 1951) vol. ii, p. 849.

striking resemblance provides a connecting link between prehistory and history. For numismatists, this is significant because it increases their confidence with regard to the period of this particular variety of coins, which has long been in dispute among them. For scholars interested in scripts, it is noteworthy because it helps them in tracing the evolution of an ancient writing.

Before we discuss the common variety of symbols and devices on Indus seals and punch-marked coins, let us consider the character and chronology of these artefacts. Among the most successful artistic achievements of the Indus Valley people, the Indus Valley seals are generally made of steatite stone, and range in size from half an inch to just over two and a half inches square. There are two main types: first square seals with a carved animal and inscription; second, rectangular seals with one line of inscription only. Some of these seals, especially those depicting animals, have a small perforated boss at the back, while the backs of others are convex and have a hole running through them at right angles. The carving of the figures and script-signs has, in general, apparently been done with a small sharp chisel or a triangular burin in the case of some script-signs. They were then apparently coated with an alkaline substance and heated to give them their attractive, slightly lustrous dead-white appearance.[7] The frequency with which these seals have been unearthed from all major Indus Valley sites, suggests that they were generally carried about by the people of these prehistoric cities.

The punch-marked coins are, on the other hand, rude and ugly bits of silver or copper bars and bear no legends. They cannot be dated precisely and, as a rule, are not assignable to any particular region or dynasty. They are, however, of immense significance as indicators of the early history of coinage and of the relgion, mythology and economy of ancient India which remained current throughout the Subcontinent for many centuries. Much has been said about the minting and circulation of these coins. Alexander Cunningham puts the point of their origin at about 1000 B.C.[8] This may not appear to be an exaggeration in view of the fact that in Europe the earliest dated coins of this class go back to 700 B.C. But the excavations so far carried out in Pakistan, Afghanistan and India have not led to a corroboration of the date assigned by Cunningham. The earliest examples so far known are from the Bhir Mound (Taxila), which go back to about 400 B.C.[9] These coins, however, continued in circulation well up to the first century of the Christian era, or even later.

The symbols and devices common to the Indus seals and the punch-marked coins are classified below according to their types:

1. animal motifs;
2. human figures;
3. geometric designs;
4. solar and zodiacal symbols;
5. miscellaneous devices.

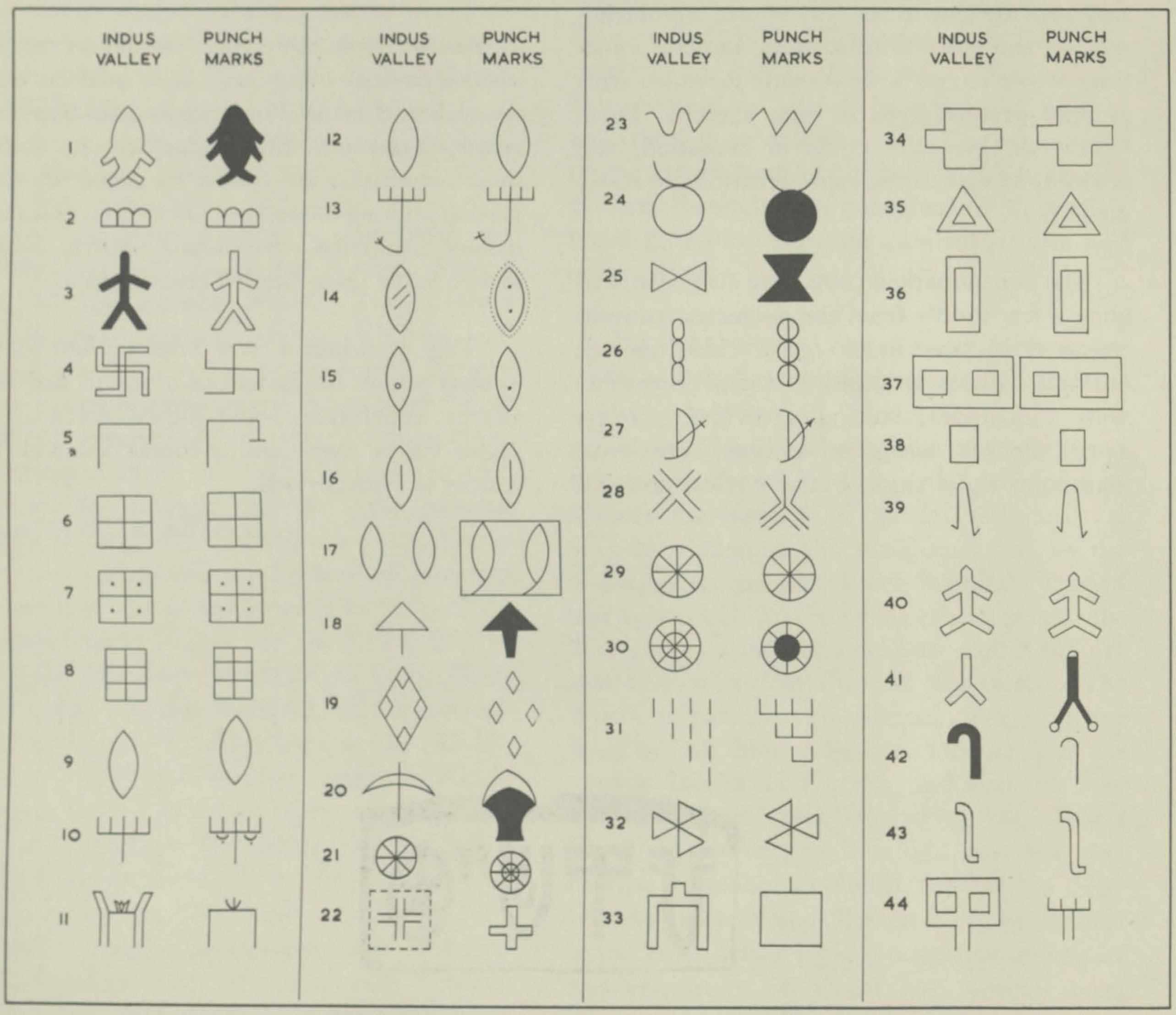
A representative selection of these symbols and devices on the seals and coins has been arranged on the accompanying plates on a comparative basis. These figures have been prepared mainly with the help of the sign lists of Sir John Marshall in his *Moenjodaro* and *Taxila*, and from the material published by Durga Prasad.

The animals and reptiles commonly represented on the Indus Valley seals comprise humped bulls, elephants, rehinoceros, crocodiles, fishes and frogs etc. All these animals have also been represented on the punch-marked coins; and, in particular, the rectangular silver coins of this category bear surprisingly natural

7 Ernest Mackay, *Early Indus Civilizations* (London, 1948), p. 126 *sqq*.
8 Alexander Cunningham, *Coins of Ancient India* (Varanasi, 1963), p. 43.
9 John Marshall, *Taxila*, vol. ii, p. 751.

COMPARATIVE TABLE OF THE SYMBOLS ON INDUS VALLEY SEALS AND PUNCH MARKED COINS

Plate I



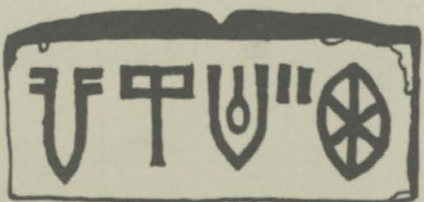
c.f. John Marshall, Mohenjodaro and the Indus Civilization (London 1931) vol. ii p. 434 sqq and vol. iii pls. CXIX - CXXIX; Jour. and Proce. of the ASB, vol. XXX 1934 (Num. Suppl.) Plate 28.

representations of these animals. The figures punched on the coins generally look as if they had been copied directly from the Indus seals. Similarly, the human figures quite frequently depicted on both the seals and the punch-marked coins also present striking similarities of execution. The most popular and common device is a row of human figures facing backwards. This device seems to be religious in character, and may provide clue to the way of worship during the pre- and proto-historic times. Besides, sometimes a single man is shown with extended arms as if he were engaged in some exercise. These figures are generally crude in execution, and attempts at naturalistic representation are rarely made here.

The punch-marked coins have also borrowed quite a few motifs from the geometric patterns engraved on the Indus seals. These include multiple squares arranged in fours, sometimes with dots inside; rectangles divided into six equal blocks; triangles; crosses, criss-cross markings; right angle ovals; circles, arcs etc. Apparently solar symbols appearing on the seals as well as on the coins provide yet another field for study. Many varieties of wheel devices, the swastika design and the triskele are among the most common motifs on the seals as well as on the coins. The so-called taurine or bull symbol, i.e. a crescent on a circle used in astrology to denote a Zodiacal sign, is extremely common on both the seals and the coins.

Besides these, there are a number of miscellaneous devices which have been used on both the seals and coins. For instance, the bow and arrow, sometimes shown together and sometimes separately, are frequently depicted, suggesting hunting or warfare. Other objects shown include umbrellas, eye-shaped figures, loops, leaves, wavy lines, beaded chains, etc.

This is indeed a very brief outline of the subject which needs serious study to arrive at definite conclusions about the evolution of the Indus Valley script and its connection with the history of later periods.



A Few Harappan Sites Explored In Sind

N. A. Baloch

THE early human settlements and the extensions of the Indus Civilization being a function of the changing course of the Indus, a search for the location and identification of prehistoric sites can profitably be made mainly along the old courses of the Indus. A guiding hypothesis may be formulated: if one follows the old beds of the Indus and its channels, it is very likely that more surviving prehistoric sites will be discovered.

The changing courses of the Indus are usually grouped into (i) the Western System and (ii) the Eastern System. The Western System approximately coincides with the present course of the Indus, while the Eastern System is represented by the Hakra Nara (Nara-channel), referred to as the 'Eastern Nara' beginning with the official records of the 19th century. In between the two—and running mainly through the central parts of the Khairpur, Nawabshah and the Hyderabad Districts, the western part of the Single District, and the south-western fringe of the Tharparkar District —lie the abandoned beds of Lohano, Phito, Puran, Ren and the Guni, which, for convenience sake, may be designated as the 'Middle System'. Both the Western and the Middle Systems had a common apex in the north-westerly bend of the Indus in the Rohri-Sukkur section; but the Eastern System, representing the Wahinda-cum-Hakra Nara courses through Bahawalpur and Sind, remained independent. The continuity between the northern Wahinda beds in Bahawalpur and the Hakra Nara in Sind is well established by the intermediary beds of Reni and Gorhalo in the Ubauro—Mirpur Matheolo tract of the Rohri Division (District Sukkur).

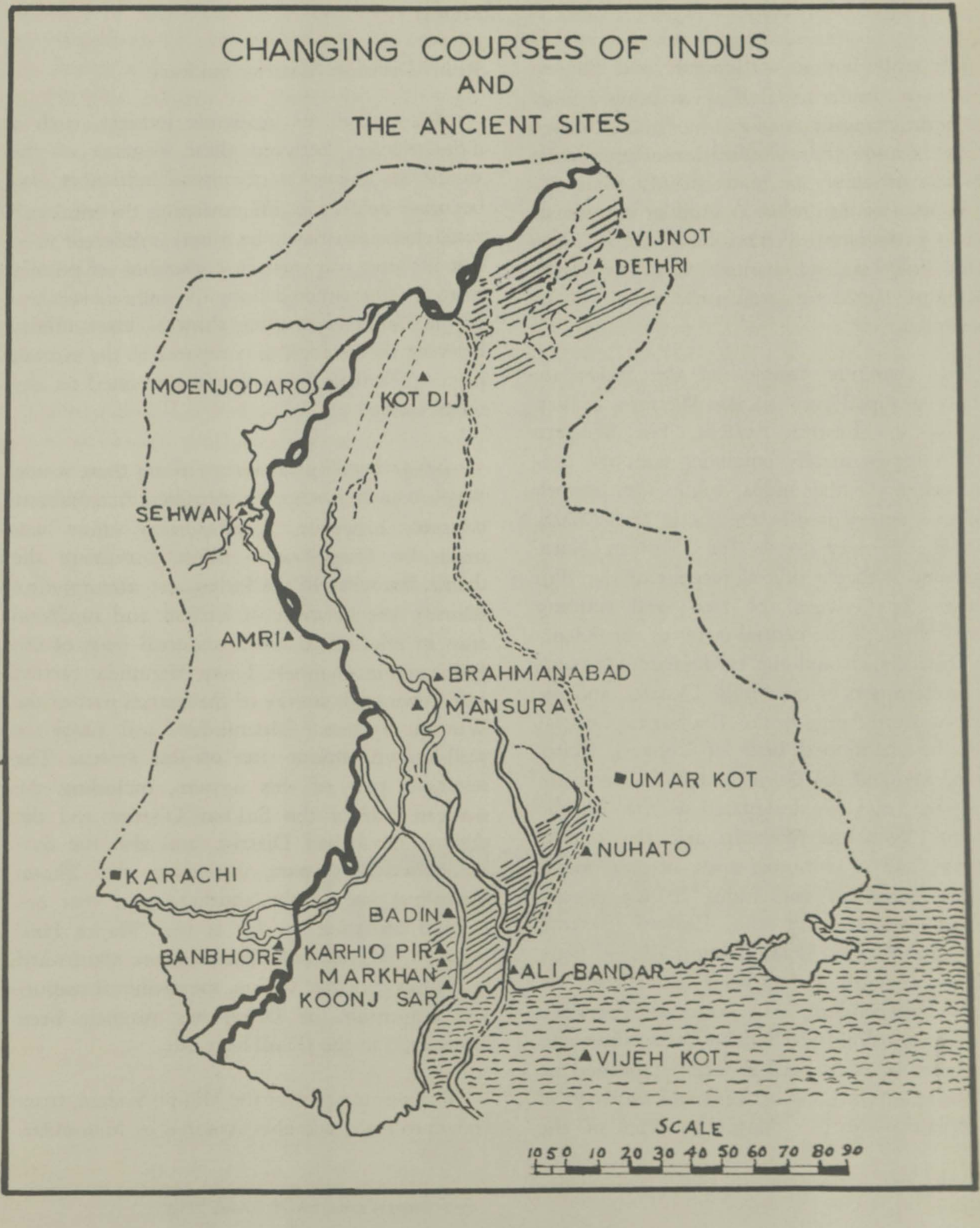
Apart from its academic interest, such a differentiation between these systems of the waterways as carriers of cultural influences, also becomes helpful in differentiating the local cultural characteristics to be found at different sites. For instance, the surface collections of pottery from the sites situated along the different sections of the Hakra Nara often show a closer affinity between themselves, as compared to the pottery pieces picked up from the sites situated on any other system.

No archaeological survey along these waterways, as such, has been undertaken. In a different content, however, a pioneering effort was made by Haig,[1] who while surveying the deltaic branches of the Indus, also attempted to identify the location of ancient and medieval sites in relation to the abandoned beds of the Indus and its channels. Later, Majumdar carried out a thorough survey of the central part of the Western System.[2] Moenjodaro and Amri are well-known ancient sites on this system. The northern part of this System, including the western half of the Sukkur District and the eastern Jacobabad District, and also the System's southern part, including the Thatta Bhuddhist site in the southern part that has escaped attention so far is the 'Majira Hill' between Jherruk and Thatta. More southward in the lower deltaic region, the medieval seaport and emporium of Debal has recently been discovered in the Bhanbhore site.

The western part of the Middle System, from Halani to Hala, was also explored by Majumdar.

1 M.R. Haig, Major General, *The Indus Delta Country* (London, 1894).

2 G.N. Majumdar, *Exploration in Sind, Memoirs of the Archaeological Survey of India*, No. 48 (Delhi, 1934).


CHANGING COURSES OF INDUS
AND
THE ANCIENT SITES
VIJNOT
DETHRI
MOENJODARO
KOT DIJI
SEHWAN
AMRI
BRAHMANABAD
MANSURA
UMAR KOT
NUHATO
KARACHI
BADIN
KARHIO PIR
MARKHAN
KOONJ SAR
BANBHORE
ALI BANDAR
VIJEH KOT
SCALE
10 5 0 10 20 30 40 50 60 70 80 90

An important site in this part is Bahamjodaro, near the Bandhi Railway Station, which needs to be excavated. Materials of the early Muslim (Arab) period are frequently found from its surface area. Other Arab sites are scattered all along the old bed running through Naushahro Feroze and Kandiaro Talukas. The mounds near Bhiria (near the village of Bhirio Naich) and the mound of 'Kot' represent important Arab sites. The southern part of this Middle System—represented by the three subsidiary courses of (i) the Lohano-phito, (ii) Puran, and (iii) the Ren—have not yet been explored. Mansurah, Jun, Fateh Bagh, Tharee, Raree and old Badin are some of the known sites of the Muslim period on this system. Besides, there are a number of pre-Muslim sites, of which Bahmanabad, Marri Wasayo (near Golarchi) and Dalhadi-jo-Bhirro (in Deh Khari Dabi) are important and need to be excavated.

The Eastern System has not been explored so far. It is the ancient and more stable character of this system that made it an important waterway for the founding of early settlements along its banks, from the far north to the far south. The ruins of numerous sites are visible to this day in the present Chulistan (desert) area in Bahawalpur, in the Rohri Division of the Sukkur District, and further south within the limits of the present Khairpur, Sanghar and Tharparkar Districts.

Earlier, one might have thought that the Harappa Culture flourished along the Western System and was limited to it, since its centres at Moenjodaro and Amri are both located on it. The later discovery of Kot Diji on the Middle System has, however, indicated that the Culture was not confined to the Western System alone. This would raise a presumption that the Eastern System also served as a carrier of this culture towards the south. Since the Hakra-Nara has been the only ancient waterway skirting the eastern part of the Indus Valley, continuing for southward through the present Rann (desert) between Sind and Kachh, it may be presumed that this was the main waterway along which the Harappan Culture travelled to Lothal, and possibly to other parts of Kachh-Kathiawar-Gujerat. This hypothesis can be tested by excavations at various sites on the Hakra-Nara system.

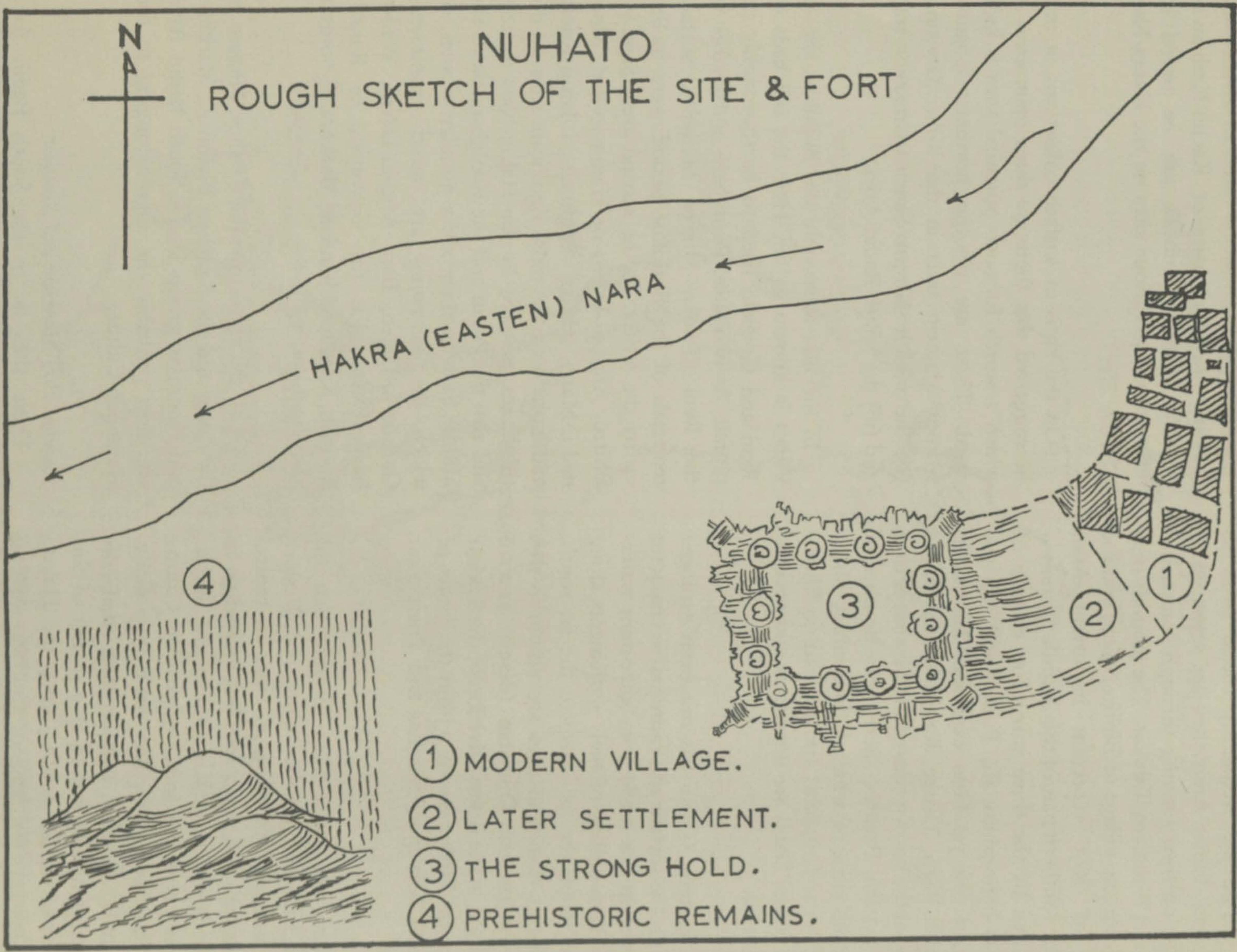
On the basis of surface collections, it may be suggested that there are three main areas in which a search for such potential sites is indicated. These are (i) the northern Ubauro-Mirpur Mathelo tract in the Rohri Division, (ii) the middle Khipro-Samaro-Umarkot tract and (iii) the South Badin Area.

In the first area, only the Buddhist site of Vijnot is known so far. Here the old beds of Reni and Gorhelo need to be thoroughly explored. At two sites, Peengharo and Dethri on the Reni (Taluka Mirpur Mathelo), surface materials of the Buddhist period were picked up by the writer. In the second area, Sami-jo-Bhirro, Ahur-jo-Darro or Hamir-jo-Pad, Moomal-ji-Marri, Hasan Baghban, Lilan-ji-Kandi and Nuhato are the more significant sites. In the third area, watered by the Hakra-Nara System and also the Puran and the Ren channels of the Middle System, there are a number of sites, of which the following are more prominent: Garhiar-jo-Darro, Barr Arni-jo-Darro, Wadohar-jo-Darro alias the Graveyard of Raipal, Roopah, Karahyo Bhandari, Markhan, Koonjsar and Vigehkot.

Of all the above-mentioned sites, Nuhato in the north and the Karahyo Bhandari, Markhan and Koonjsar group in the South Badin Area are most probably the sites belonging to the Harappan Culture.

Karahyo Pir, Markhan and Koonjsar

These sites lie in the South Badin Area (Taluka Badin, District Hyderabad) extending


N
NUHATO
ROUGH SKETCH OF THE SITE & FORT
HAKRA (EASTEN) NARA
1
2
3
4
1 MODERN VILLAGE.
2 LATER SETTLEMENT.
3 THE STRONG HOLD.
4 PREHISTORIC REMAINS.

from some 20 miles south of Badin town onwards into the wastelands of the great Rann. Due to the action of south-westerly winds and tidal waves encroaching from the far south, sites in this area have suffered considerably, particularly due to the ever increasing element of salts in the soil. During the medieval period, these lands were watered by the Ren Channel of the Middle System and also by the flood channels of the Hakra Nara. The first site was still flourishing when Saint Karahyo made it his abode (12th/13th century?); subsequently it came to be called as Karahyo Bhandari i.e. Saint Karahyo, the Generous Feeder of the Poor). Markhan was supposed to be a pious lady from amongst the women disciples of the saint. Koonjsar, i.e. 'Flamingo Water', was so called because migratory flamingos used to flock here every season.

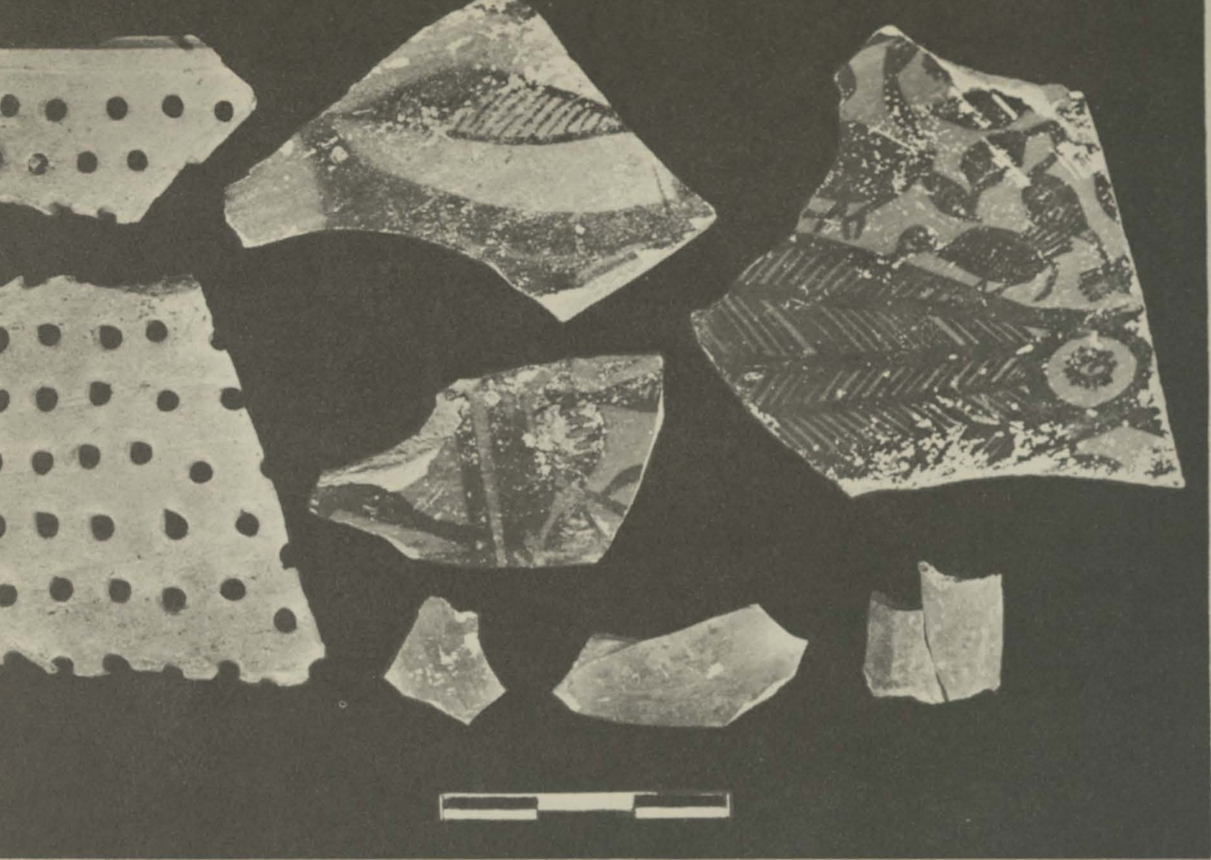
The surface collections from these sites indicate that the early settlements in this area go back to prehistoric times. Some of them also flourished during the pre-Muslim period, while others existed upto the late Soomra period of Sind's history (14th century). The prehistoric finds include chert blades, toy cart-wheels, shell bangles and rings, perforated pottery, fragments of red ware and of thick-textured, externally red-slipped pottery, painted in black with typical peacock motifs. The two China coins are reminiscent of the early sea trade between Sind and China. [3]

Nuhato

The Nuhato site is in a comparatively better state of preservation. It is situated on the left (eastern) bank of the Hakra Nara in the Umarkot Taluka of the Tharparkar District, about 5 miles south east of the Nabisar Railway Station on the Mirpur-Naokot Section. The site area consists of two distinct parts, some two furlongs apart: the Western Mound, which is a prehistoric site, and the Eastern Mound, which flourished in later historic times. The Western Mound is a large one, consisting of the central high mounds, rising more than 15 feet high, and the surrounding flat area extending towards the Hakra bank. The Eastern Mound includes a stronghold on its western tip and an adjacent (eastward) township, both situated on a bhit (a sandy mound), and now almost obliterated. Some fifteen years back, traces of the ramparts and the fort wall could be seen, but now only traces of the three western ramparts are visible. In the rough sketch of the site, the plan of the fort with the ramparts has been reconstructed on the basis of my early observations and the eye-witness accounts of local people. A small cannon was unearthed from the stronghold area in 1945 and was removed to the D. C. House, Mirpurkhas. Mr. H. T. Lambreck writing in the Journal of the Sindh Historical Society in 1946, drew attention to the importance of the Nuhato site.

The surface materials collected from Nuhato indicate that this site has been inhabited continuously throughout its long history to this day; and its foundation in prehistoric times appears to be beyond doubt. Local lore takes its memories back to the rise of the early Samma chiefs, Lakho Phulani and Jam Jakhro, some time in the twelfth century A.D. A well nearby is attributed to Lakho (and thus called Lakhey-ji-Wa); and a grave at some distance to the east is supposed to be of Mehr Rani, the divorced queen of Lakho. According to a verse, "Nuhato had nine hundred shops during the reign of Jam Jakhro". Historically speaking, it was one of the strongholds of the Soomras (1050-1350) and is to be identified with the capital of the Damrela District, which was conquered by Sultan Jalal-uddin of Khwarazm during his exploits in Sind

3 These materials were collected about ten years ago from different sites in the South Badin Area and included Hindu materials (of the pre-Muslim period?) and a horde of coins of the Tughluq period. Only representative prehistoric objects have been illustrated here.



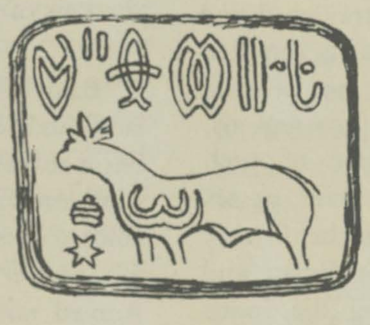
Harappan Pottery from Nubato.

Antiquities from Nubato.



(some time after 1221) [4] and which is again mentioned during the last years of the reign of Sultan Muhammad b. Tughluq (1350/51) [5] The coins collected and a small cannon of the Mughal period unearthed some time back from the ruins confirm that the town continued to be an important stronghold during the Mughal period. Thereafter, due to the uncertain supply of seasonal waters in the Hakra Nara, its population scattered and thus reduced its importance, though it has survived as an important village to this day.

The surface collections of the prehistoric period from Nuhato include perforated red ware, thick-textured black-painted pottery, terracotta balls, shell bangles, baked clay cones, toy-cart frames and wheels, ornamental terracotta beads, and semi-precious stone balls. Among these, the most significant is a rectangular blackstone seal measuring 0.65" x 0.4", with three familiar pictographs of the Indus Script. In the known Moenjodaro seals (John Marshall, Vol. III), the first two pictographs of this seal occur in the same order in two seals, No. 208 and No. 351, while the first and the third (only two) occur together in the same order in Seal No. 236. Seal No. 224 with its first two pictographs exactly the same as in the Nuhato Seal, and the third one somewhat similar, has been reproduced along with the Nuhato Seal for comparison.



4 Juwaini 'Ala al-Din Ata Malik: *Tarikh-i-Jahan Gusha* (Gibb Memorial Series; Leyden, 1966), Pt. ii, p. 148.

5 Zia-al-Barani, *Tarikh-i-Firuzshahi* (Calcutta, 1862), p. 523.

Juwaini and Barani spell it as 'Damrelah' a Persianized form of the indigenous Sindhi Dambarlo, by which name the adjacent area (now marked as a revenue unit, Deh or Tapa) to the north is known to this day.

The Indus Valley Civilization and its Contemporary Cultures

F. A. Khan

It is a well known fact that in ancient times the alluvial plains offered favourable conditions for movement from place to place, while the rivers, the mountains, the deserts and the seas formed formidable barriers to such movement. But history shows that they were not impregnable obstacles to a commercially minded people. For sea-faring nations, the oceans gradually provided the easiest routes, while in the valleys rivers became highways.

Many of the world's great rivers have through the ages been the finest roads for man and his materials. While the sea-routes provided the easiest commercial connections between civilizations in ancient and medieval times, the land routes were also constantly traversed and they shared with the Mediterranean, the Red Sea and the Persian Gulf the functions of main arteries of trade. In the mountainous regions, the valleys determined the course of such routes. They often led to mountain passes which played important roles in the history of man, such as the Khyber, the Bolan and Gomal Passes of Pakistan, linking the Indus Valley and Baluchistan with Afghanistan and Iran.

It is clear that the main mountain passes all over the world have remained unchanged from very early times, and these were, therefore, crossed by numerous routes in different periods. In fact, until recent times, the ancient routes did not change much. Whenever man wished to establish means of communication to suit his convenience, he fell back upon the old routes, and if ever he encountered any hindrance or difficulty in those routes, he modified them according to his needs and technical ability.

Geographical Setting

An essential preliminary to any discussion of the cultural relation between the Indus Valley and its neighbouring countries of Afghanistan, Iran and Mesopotamia is an appreciation of the geographical setting of these regions.

The Pak-Iranian borderlands consist essentially of that portion of the Eastern Iranian plateau that lies south of Bab-i-Koh ranges of central Afghanistan as far as the Arabian Sea Coast, including the southern Punjab and Sind portions of the Indus Valley.

Baluchistan lies at the heart of the borderlands and serves as the link between the Siestan Basin at the boundaries of Iran and Afghanistan, southern Iran and the Indus Valley. The borderlands consist largely of desert-mountain terrain, nine-tenths of which is barren most of the year. Annual rainfall ranges from almost nothing in Siestan to less than 8 inches in eastern Baluchistan.

In contrast to the barren terrain of the Makran, Kharan and western portions of Baluchistan, much of eastern Baluchistan, especially the Kalat, Zhob, Loralai and Quetta-Pishin districts, are characterised by sources of riverine water, springs and perennial wells. As a result, the population of Baluchistan is mainly centered in the east, on and about patches of productive alluvial plain.

The Indus River Valley is an enormously fertile alluvial plain. In spite of riverine vagaries, it is one of the best agricultural regions of the world. Its flat and featureless plain contrasts with both the mountainous country of Baluchistan on the west and the sandy waste of the Indian desert, which bounds it on the east.

The Pak-Iranian borderlands are therefore not unsuited to human settlement; in fact, they are much better endowed for this purpose than most of the Iranian plateau. The moderately fertile uplands of eastern Baluchistan and southern Afghanistan form the western boundaries of the Indus River alluvial plain. The evidence indicates that the interaction of the inhabitants in the uplands and those in the plain was essential to the development of civilization in the Indus Valley.

Throughout the Iranian Plateau a system of land routes linked the different provinces. The main routes naturally ran from trade centre to trade centre, and the distribution of ancient sites must be related to them. In the north the main line of communication is the west-east highway across the Iranian plateau and along the Elburz ranges to Merv and Herat. No less important is the southern highway which connects Susiana and the Bampur valley in south-eastern Iran, extending to Shahi Tump and Kulli culture sites in Baluchistan and Moenjodaro in the Indus Valley.

Parallel with the northern highway to the Oxus and more direct, this southern line of communication between Mesopotamia and the Indus Valley traversed the length of central Iran through Kirmanshah, Hamadan, Kashan, Kerman and Bampur, and then passed through central Makran to the Indus basin.

It was along this line of communication that in antiquity the early emigrants from Iran entered Baluchistan. This is clearly the most important land link connecting the north-west to the south-east, and its ancient character is attested by the long chain of ancient sites lying from Baghdad to Baluchistan and the Indus Valley. In ancient times, it would seem that this was an easy route, because it skirted the Iranian desert, following the slope of the Zagros mountains, and passed through flourishing towns and villages. Its possession by the Arabs in later times accounts for their rapid advance into the Indus Valley in the 8th century A.C.

From Susa in south-western Iran, along this highway, the province of Fars was reached. Here the ceramic products of Tell-i-Bakun (c. 3400 B.C.) show features of resemblance to the 'Quetta-ware'. The early cultures of Bampur valley dated before 2500 B.C. also show unmistakable affinities with the cultures of Shahi-Tump and Kulli. The notable feature is the painted pottery, red and buff, with designs such as humped bulls, tiny horned goats and plants with broad leaves.

The decorative elements confirm the relation with a similar stage of ware appearing at the Kulli culture sites in Baluchistan, and at Karchat, Shahjo Katiro and Chanhudaro in the Indus Valley.

This technique seems to have originated in Sialk III-5 and Hissar I-III in Iran, and to have developed at Nineveh in Mesopotamia during the Jamdat Nasr period (c. 3100-2900 B.C.).

At a later date, these characteristic features were carried to the East to leave their influence from Kerman to Seistan, Makran, Baluchistan and the Indus Valley.

Thus, we are dealing with the main route which in antiquity linked Mesopotamia and Iran with Baluchistan and the Indus Valley.

The Indus Valley Civilization unquestionably ranks as one of the great civilizations of the early ancient world. Its importance stems largely from the fact that it represents the first of the successful achievements of civilization beyond the limits of the lands that constitute the 'Fertile Crescent'. Clearly, its cultural contributions, not only to the Indo-Pakistan subcontinent, but to world civilization were far from inconsequential.

The significance and uniqueness of the Indus Civilization have been described since its discovery by eminent scholars and archaeologists. They believe this civilization possesses the following features.

It began 'explosively' as the result of successful colonization of the Indus Valley by inhabitants who won out after centuries of 'failure succeeding failure' by early 'pioneers'. Once established, the Indus people achieved a lighting subjugation of the large Valley and adjacent coast. The civilization centered around two metropolitan centres, but stretched out from western Baluchistan to Alamgirpur beyond Delhi, and from the Punjab to the Narbada—forming the most extensive civilization of the proto-historic period.

An authoritarian regime, with priestly attributes which developed cultural uniformity, probably controlled the civilization. The implication is that the rulers enforced their control from dual capitals—Harappa and Moenjodaro—in which were situated 'embattled' citadels, centres of both ceremonial and secular functions.

Though there are outstanding differences there are also general affinities with Early Mesopotamia, whence the Indus people had received the 'idea of civilization' and in some instances perhaps more than an idea, for "as a scatter of Indus Seals and other trifles in the Mesopotamian cities shows, it traded with its neighbours of the Persian Gulf from the 800 miles of coast line which we must now allow it."

As now known, the Indus Civilization possesses a characteristic style. Wherever it appears it presents a particularly striking unity; certain features are identical at sites distributed from the foot of the Himalayas to the Arabian Sea coast.

These features include locations close to the plain of a river, burnt brick buildings with wells and drains, seals and seal writing, an emphasis on representation of animals on seals, stone and bronze tools and weapons, stone weights, terracotta human and animal figurines, balls, rattles and cakes, the pottery corpus, perforated vessels, bath-tubs and storage jars.

In widely dispersed areas, such as Baluchistan, Sind, Punjab, Bikaner and Gujarat, monumental buildings are situated on the highest parts of the sites.

The available impression is that of a stable conservative civilization reminiscent of the Old Kingdom in Egypt, but certainly differing from the impression one has of ancient Sumeria. Some authorities have assumed that this conservatism was the result of a political administration, probably theocratic, whose role is best exemplified by the fact that State buildings were situated within the walls of a citadel.

Thus, the two principal cities, Harappa and Moenjodaro, were twin administrative capitals. Some emphasis has been placed on the identification of these buildings as probable temple and college buildings, granaries and barracks, which underlines the autocratic nature of administrative control. The over-all description is based on a socio-economic determinist pattern, of which the late V. Gordon Child was a leading exponent. It is clearly modelled on

Mesopotamian parallels. However, if we examine the parallels, the differences are apparent. Sumerian Civilization is charaterised by a multiplicity of city-states, an efficient writing system, a man-god relationship, a progressive technology, a changing art style, international contacts, organized warfare, an extensive and effective irrigation system. These characteristics are largely absent from the Indus Valley Civilization.

The chronological priority of Sumerian civilization among world civilizations, and the general role now accredited to the Mesopotamian Citilization in motivating the pre-dynastic florescence that preceded the Egyptian Civilization have naturally directed scholars to assume that the Indus Civilization stemmed from direct contact with Sumer or that pre-Indus Civilization inhabitants of the region were motivated by stimuli from Mesopotamia.

Thus Mesopotamian ethnocentricism has been reinforced by the discovery of Indus Seals in Mesopotamia, confirmed in the Akkadian context or even earlier. Mesopotamian cylinder seals have also been found in the Indus Valley context.

The Sumerian reference to the populous land of Dilmun, to the East, has motivated the eminent American Sumerologist, Samuel Noah Kramer, to look for it in the Indus River Valley. However, he also saw the possibility that people of the Ubaid Period (c. 3500 B.C.-2900 B.C.), driven from Mesopotamia by the Sumerians, came to the Indus Valley where they initiated the development of civilization.

But we know that the Indus Valley Civilization was already flourishing from about 2500 B.C. Nothing in the present evidence suggests that the urbanization within the Pak-Iranian borderlands during the period between 2500 to 1700 B.C. was the result of exterior influence.

The florescence of culture at Moenjodaro and other urban sites apparently had its source in a built-in advantage based on the technology and interacting population of an already developed farming culture, which was rendered effective by the advantages of the Indus River ecology. There is little doubt that had suitable soil and weather made a more concentrated population possible, urban conditions could have developed contemporaneously in Southern Afghanistan and in parts of Baluchistan.

It appears evident that the contact between the highlands and the Indus plain had a significant role in developing the Indus Civilization. Given the concentration of settlement made possible within the confines of the fertile but limited expanses of the neighbouring upland valleys of the Pak-Iranian borderlands, human interaction was accelerated and ideas moved across regional boundaries. Initially, this interaction was maintained when the Indus River Valley was settled. As time passed in the almost unrestricted expanse of the Sind-Punjab area, concentration of population was reduced, interaction between differing societies slowed down and men settled into stable lives with no stimulus towards any major change. Thus the characteristic style of the Indus Civilization was created.

New Evidence

In view of the various interpretations of the Indus Civilization, an assessment of the recent discoveries of new and important evidence bearing on them is important.

The first body of new evidence arises from the increase of excavated remains belonging to times preceding the Indus Civilization. Prior to 1955, the limited excavations of Majumdar at Amri and Sir Mortimer Wheeler's discovery of a non-Indus Civilization level at Harappa were the only evidence of a pre-Indus Civilization. In 1955, excavations at Kot Diji

revealed an extensive pre-Indus Civilization settlement which contained abundant evidence bearing on the indigenous character of the Indus Civilization. Later, J. M. Casal explored the Amri site, which previously had been only superficially excavated. Here the evidence points to rather close typological connections between pre-Indus Amri and pre-Indus Kot Diji and comparable village assemblages of Southern Baluchistan. A number of pre-Indus Civilization sites are situated along the banks of the now extinct Ghaggar River branch of the Indus system in Bikaner. There the excavations at Kalibangan suggest the existence of ties with pre-Indus Kot Diji. The unexcavated site of Bhoot in Bhawalpur marks the existence of a pre-Indus settlement between Bikaner and the type site. Most recent evidence of pre-Indus Kot Diji comes from Jalilpur in Multan district and Sarai Khola near Taxila.

These trends in the interpretation of the new evidence for the dawn of the Indus Civilization are obviously of great importance. On the present evidence, we believe that the style of the Indus Valley Civilization had its manifestations in a region remote from the coast where contact with the Sumerian Civilization is assumed to have occurred. This is not to say that such contact may not have occurred overland, as it probably did later, but that it is unlikely that contact and diffusion with Mesopotamia germinated the Indus Civilization. It does suggest that the Indus Civilization was an indigenous development that arose out of the evolution of developed village cultures in a favourable environment. It emphasizes the subcontinental roots and the consequent style which gives the civilization its uniqueness.

Conclusions

On the present evidence, the Indus Civilization cannot be said to have originated through direct or even stimulus contact with Mesopotamia, even though civilization emerged earlier in the latter region.

The available evidence suggests that a concentration of developed village settlements in the highlands of the Pak-Iranian borderlands provided interactions that made for a constantly improving and intensified method of using local soil and water resources, as well as advancing technology and creating social and political institutions necessary for civilized beginnings in the Indus Valley.

The construction of dams and, with these, the fullest use of available land, the use of cattle for ploughing, the development of a mutually intelligible system of signs and symbols, the creation of local surpluses, which provided for the support of professional craftsmen, the institutionalizing of religious forms, and the development of domesticated animal breeds adapted to the ecology of the borderlands are suggested as significant pre-Indus Civilization advances in the highlands of the borderlands.

Essentially, highland village cultures were the first to move into the Indus Valley itself in pre-Indus Civilization times. We do not know how long a period of experimentation in minor settlements in the valley was involved. Absent from our evidence are the data which would demonstrate the variety and number of changes necessary for the adaptation of highland or Iranian varieties of cereal plants to the situation in the Indus River Valley.

The evidence indicates that settlement, once it occurred in the Indus Valley, was concentrated in northern Sind and on the slopes of the Kirthar Ranges at the western edge of the valley, whence it spread south and east.

However, the largest concentration was on the southern borders of the great alluvial plains of Kachhi, where water was obtained from both the nearby drainage of Baluchistan or a branch of the Indus River emerging above Sukkur.

Here developed the characteristic style that we call the Indus Civilization. The cultural florescence of the bearers of that style was rapid, and resulted in the creation of the great urban centres of Moenjodaro and Harappa.

It seems evident that the natural soil and water advantages of the Indus River Valley made this florescence possible. For example, a richer return per acre planted resulted in large surpluses, which in turn supported a larger population and permitted the development of non-farm specializations.

Thus the village priests became a priesthood, the metallurgist became one of many, as did the potter, weaver, seal-cutter and the like. More private buildings and large public buildings were mandatory in such a situation. The use of fired bricks, instead of sun-dried bricks, in building foundations may have been a response to the challenge of the flood danger of the Indus Valley. Village silos became urban granaries. Village dances became temple rites.

Contemporaneity of the Indus and Mesopotamian Civilization

Several finds from the Indus Civilization sites, such as bronze pins, etched carnelian and segmented faience beads, are assignable to more or less definite dates before and after 2000 B.C. on other sites in western Asia; whilst excavations in Mesopotamia have yielded seals and other typical Indus Civilization products in strata dated to about 2300 B.C. Certain objects are especially noteworthy in this connection: cylinder seals of the Mesopotamian type but showing animals peculiar to the Indus region, namely, elephants, rhinoceros and crocodiles; seals depicting horned deities; knobbed ware, a typical Indus product found also at Tell Asmar; a fragment of a vessel of light green steatite with a mat pattern, of a kind found in Mesopotamia and elsewhere on sites of the third millennium B.C., trefoil patterns found in Mesopotamia, dated about 2300 B.C. and later in Egypt; etched beads of carnelian; segmented beads as found in Egypt on sites of the sixteenth century B.C.; gold disc beads with tubular holes; rings of shell inlay; and stone incised ware.

These parallels do not necessarily indicate anything more than a trade connection. They are most important however, because they give dating evidence, and indicate that the Indus Civilization was flourishing from about 2500 B.C. onwards, and no doubt at the beginning of the second millennium B.C. The initial date is based on the Mesopotamian parallels of the Early Dynastic III period.

If the links between the Indus and the Sumerian Civilization are simply due to trade and do not point to a common origin, then the discovery of the Indus Civilization is even more significant, because it reveals a high degree of cultural development which occurred independently in the Indus Valley.

Relationship with Iran

The lower levels at Moenjodaro yielded a a very important piece of evidence in the shape of a fragment of a green steatite bowl with a carved mat design. This ware seems to have been the Sumerian product of the Early Dynastic II-III period. It may first have been made about 2750 B.C. and subsequently remained in use till Akkadian times (c. 2400 B.C.). These two dates may be used as evidence for the use of this ware in the Susa II period in Iran, and we may perhaps assume that it had reached the Indus Valley round about 2400 B.C.

Together with the carved steatite ware, there were also discovered at Moenjodaro fragmentary incised grey stone boxes for keeping valuables or cometics. Such boxes have been found at the Shahi-Tump and Mehi sites in Baluchistan; Bampur in Iran and Tell-Amsar in

an Agade period context (2400-1800 B.C.). The Mesopotamian specimen once again helps to determine the relationship between Bampur and Moenjodaro.

The bronze hairpins, with single and double spirals, and animal heads suggest a definite relationship with Hissar IIIb, Shah Tepe IIa, b, Turang Tepe and Anau III (2400-1800 B.C.). The axe-adzes point to a connection between the later Indus Civilization and Hissar III.

The etched cornelian beads may be simply imports from the Indus Valley into Hissar III and Shah Tepe II. Other objects suggestive of resemblances between the Indus and Iranian cultures include notched and segmented faience beads reported from Hissar III and Shah Tepe; gold head-bands from Hissar III; bronze coiled bracelets and finger rings found at Hissar IIIb and Shah Tepe; terracotta female and animal figurines; double animal protomes in terracotta from Harappa and bronze types from Hissar III and Luristan; terracotta toy carts from Anau; bird whistles and zoo-morphic clay vessels.

Among the pottery forms, the distinct wares which show unmistakable Indus Valley connections with the pottery of north-eastern Iran and Anau are the dish-on-stand, perforated vessels, feeding cups and vessels with knobs.

It is therefore evident that the Indus Civilization, in spite of its self-sufficiency in cultural materials of varied kinds, did not remain isolated in the Indus Valley, but came in contact with Mesopotamia, north-eastern Iran and Anau. It is, perhaps, surprising that there was not a closer relationship with Susiana or south-west Iran, where except for a few general pottery motifs, there is nothing much to suggest any indication of strong association between all these cultures.

The probable approach between the Indus Valley and north-east Iran seems to have been via Seistan, whose geographical position played a very important role. It is presumed from the exchange of objects in the two areas that contact was maintained chiefly for commercial purposes, and that much of the evidence may have perished. Thus trade in cloth, spices and cosmetics could hardly be expected to leave any trace in the ground; and there may have been an exchange of craftsmen too. Such intercourse might have been sufficient to necessitate the establishment of small trading communities of foreigners—Iranians in the Indus Valley and Harappan traders in north-eastern Iran.

General Conclusions

The comparative study of the Indus Civilization presents several interesting features. It offers a striking resemblance to the ancient cultures of Sumer and Iran. The well-developed and organized city life, the use of the potter's wheel, the use of metals (except iron) and semi-precious stones, and above all, the script, are some of the common and distinctive features of the early cultures of these regions.

The discovery of some of the identical archaeological material, leaves no doubt that there was intercourse between these countries. The question, therefore, naturally arises: were the early cultures of these areas developed independently, or were any of them an off-shoot of the other? To put the same question in another form, did the Indus Civilization influence spread to the west or vice-versa? Or are we to assume that the growth of the Indus Civilization was influenced by contemporary cultures in the west? In any case, our efforts must be directed even further afield to understand the Indus Civilization on its own terms.

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The Burial Practices among the People of the Indus Valley Civilization

Sh. Khurshid Hasan

THE concept of death and life hereafter has varied among people in different parts of the world. Some people believed death to be the result of God's curse; some ascribed it to the action of some supernatural power, like gods or spirits of witches. Whatever the beliefs, the horror of death has always haunted the human mind.

The religious beliefs professed by various communities have regulated the modes of disposing the dead. Various practices were followed: cave deposit, water burial, earth burial, preservation in huts or under the floor of dwelling houses, cremation and mummification. All these practices reflect various beliefs or ideas concerning life after death. For instance, behind cremation lies the idea of getting rid of the ghost of the dead. Some thought that cremation protected the survivors against the malignance of the dead. Others regarded cremation as a means of freeing the ghost from the bonds of earthly life and uniting it with the society of departed souls in the life beyond.

The skeletal material recovered during the excavations at several sites of the Indus Valley Civilization has provided a great deal of information on the burial practices of its people. Most of this information has been gathered from excavations at Harappa, Kalibangan and Lothal, as the evidence found at other sites have been incomplete. Whereas elsewhere only some stray graves have so far been brought to light, at Harappa and Kalibangan as many as three extensive cemeteries have been found. At Harappa, the type site of the civilization, Cemetery R-37 and Cemetery H were discovered in 1937 and 1928 respectively. Cemetery R-37 was excavated by K.N. Sastri for four years. According to him, about fifty earth-burials were exposed [1] Later excavations at the site carried out by Sir Mortimer Wheeler in 1946,[2] and by M. R. Mughal in 1966[3] revealed 21 more graves.

Cemetery H is situated to the south of the citadel of Harappa at the foot of Mound D and E, and was excavated between 1928 and 1934 by M. S. Vats. It comprises two strata; Stratum I (on top) represents true fractional burials in earthen vassels. Vats was able to recover more than 120 burial jars of various shapes and sizes.[4] Wheeler uncovered three more pot-burials in Stratum I from here.[5]

About three to six feet below Stratum I of jar burials, two dozen extended burials were uncovered.[6] Sastri, however, has reported sixteen burials,[7] among which thirteen were complete, while the remaining were fragmentary.

It is rather surprising that Moenjodaro has not yet revealed any regular cemetery relevant for the present discussion. However, during the

1 K.N. Sastri, *New Light on the Indus Civilization*, Vol. II (Delhi 1965), p. 39.

2 R.E.M. Wheeler, 'Harappa, 1946: The Defences and Cemetery R-37' in *Ancient India* (New Delhi, 1947), No. 3, p. 85 Wheeler has, however, given the number of graves as 47 only.

3 *Pakistan Archaeology*, (Karachi, 1968) No. 5, p. 68.

4 M.S. Vats, *Excavations at Harappa* (Delhi, 1940), p. 204. Sastri has, however, given this number as more than 135, *op. cit.*, p. 2.

5 Wheeler, *op. cit.*, p. 89.

6 Wheeler, *The Indus Civilization*, (Third Edition) Cambridge, 1968), p. 69.

7 Sastri, *op. cit.*, p. 7.

excavations at the site between 1922 and 1929 and in subsequent years, at least thirty-eight skeletons and human bones were recorded from unstratified levels. This group is important for determining the race of the ancient inhabitants, when considered with the evidence of other sites. The human skeletons found at Moenjodaro may be classified in the following groups:—

(a) Skeletons of thirteen adult males and females and one child, with traces of bracelets and rings on them. These were found in Room 74 of House V in the H. R. Area.

(b) Six skeletons, five adults and one child, found in a street between the two houses in the V. S. Area.

(c) One skeleton discovered in the Deadman's Lane of the H. R. Area.

(d) Nine skeletons of four adults and five children found in the D. K. Area in a pit with two tusks of elephants.

(e) Four skeletons found in Block 8A in the D. K. Area. Two skeletons were lying on the stairs of a well-room. The remaining two skeletons were also found lying close by.[8]

(f) Five skeletons, consisting of three males, one female and one child, found at the western fringe of the H. R. Area excavated by G. F. Dales in 1964.[9]

The site of Lothal is located on the coastal flats in the Ahmadabad District of India at the head of the Gulf of Cambay. Here, the earliest occupation represents the Harappan culture. The excavations carried out at this site have discovered ten burials.[10]

At Kalibangan, located in the Ganganagar District of northern Rajasthan, excavations between the years 1962 and 1969 brought to light an Indus cemetery similar to the R-37, which demonstrates three types of burials: (i) extended inhumations in rectangular or oval graves; (ii) pot burials in circular pits; and (iii) pottery deposits in rectangular or oval graves.[11] The latter two methods of burial are not associated with any skeletal remains, and thus are unique features not found anywhere else on the Indus sites. Several graves of the first type were excavated, while the second type comprised only ten pits.[12]

Burial Practices

In the Indus Civilization, the most common burial practice was inhumation in an extended or flexed position with ceramic and other equipment. The grave pits of cemetery R-37 indicate variations in size ranging from 10 to 15 feet in length, 2-1/2 to 10 feet in width, and 2 to 3 feet in depth from the present surface. The average size of the Indus graves would be about 10 by 3 to 4 feet with a depth of 2 feet. The pit is generally wide towards the head to accommodate large quantities of pottery near the head; but in some cases also at the feet and along the side.

The grave, both at Lothal and at Kalibangan, was lined on all sides with mud-bricks plastered from the inside. The cemetery R-37, two of the graves recovered in 1946 call for special mention. One grave was outlined internally with mud-bricks, which formed a sort of structural coffin. The shape of the grave was of unusual

8 In *Ancient India*, No. 3, (New Delhi, 1947), pp. 83-84.

9 George F. Dales, 'New Investigations at Moenjodaro', in *ARCHAEOLOGY*, (New York, 1965) Vol. 18, No. 2, p. 147.

10 Wheeler, *The Indus Civilization*, (1968) p. 69.

11 B.B. Lal and B.K. Thaper, 'Excavation at Kalibangan; New Light on the Indus Civilization' in *Cultural Forum* (New Delhi, 1967) Vol. IX, No. 4, p. 86.

12 *Indian Archaeology* 1963-64—*A Review* (New Delhi, 1967), p. 39.

dimensions: 15 feet long, 10 feet wide and 3 feet deep. The other grave, probably of a woman, was buried in a wooden coffin, about 7 feet long and 2 to 2-1/2 feet wide. The thickness of the sides of the coffin was 1-1/2 inches. The remains of some sticky black substance running over the toes of the dead body suggested the presence of a lid made of deodar wood.[13] Some traces of a reed shroud surviving from the pelvic girdle to the upper vertebra were also noticed. It may be pointed out here that both the coffin and the reed shroud are familiar features in the Sumerian cemeteries of the third millennium B.C.[14]

The bodies were generally laid in an extended position from north-east to south-west.[15] There were, however, a few exceptions: Skeletons No. H-695, H-697 and H-710 at Harappa were laid from east to west (with their head to the east). Skeleton No. H-698, however, presents a solitary instance where the body was laid from west to east. [16] In three cases the bodies were lying in other direction as well. Five skeletons at Harappa, bearing Nos. H-484-A, H-501-A, H-502, H-696 and H-697, had their legs inflexed, while in other cases the legs were stretched. During the excavations of 1966 at Harappa, a burial was found in which the legs were folded upwards with the left arm under the chin and across the chest. The mouth was open.[17]

The dead were sometimes adorned with personal ornaments. In cemetery R-37, necklaces of steatite beads, anklets of paste beads, copper ear-rings, shell bangles and beads of steatite and paste were the most common accompaniments. A copper ring was found on the right ring-finger of a skeleton. Besides personal ornaments, pottery and toilet articles occasionally formed part of the grave furniture. From the total number of graves found in Cemetery R-37 between 1937 and 1946, twelve yielded handled copper mirrors, others produced saucers of pearl, shells, an antimony stick and one large shell spoon.[18] Among the eleven burials found in 1966, two females were wearing anklets of tiny beads and girdles of beads of semi-precious stones. Two conical pendants of gold were also found with these anklets.[19] The other grave furniture unearthed included a long animal bone, a chert blade and a shell bowl.

At Kalibangan, in one case, a copper and bronze mirror was found in an earth burial.[20] At Lothal, however, the graves were poorly equipped and contained very few objects. However, some grave furniture was found including shell beads, copper rings, small jars and dishes-on-stand.

It is worth mentioning that, with the exception of two graves, personal ornaments and toilet objects were totally absent in the burials of Cemetery H, Stratum II, at Harappa.[21] In one case, a female was found wearing a gold bangle on the left wrist, while in the other, a crushed human jaw had three surviving teeth tied with fine gold wire for security.

In additon to the extended inhumations, information on pot-burials and graves with pottery only, but possessed of markings indicative of burials, is also available from the Indus sites. The majority of the pot-burials come from Cemetery H, Stratum I, at Harappa, which is assignable to the post-Indus period. A few pot-burials of the mature Indus period and contemporary with Cemetery R-37 have been found at Kalibangan.

13 K.A. Chowdhury and S.S. Ghosh, 'Plant Remains from Harappa' in *Ancient India* (New Delhi, 1951) No. 7, pp. 3-19.

14 *Ancient India* (1947) No. 3, p. 88.

15 *Pakistan Archaeology*, (1968) No. 5, p. 68.

16 Vats, *op. cit.*, Vol. I, p. 220.

17 *Pakistan Archaeology*. No. 5, p. 68.

18 *Ancient India*. No. 3, p. 86.

19 *Pakistan Archaeology*. No. 5, p. 68.

20 *Indian Archaeology*, 1963-64—*A Review* (New Delhi, 1967) p. 38.

21 Sastri, *op. cit.*, p. 55.

Stratum I of Cemetery H consisted of true fractional burials, from where 135 pot-burials were recorded.[22] Of these, 35 contained bones of adults, 31 of children, 6 of doubtful ages, 11 of infants, and 51 pots which only contained percolated earth, no bones. Keeping in view the size and shape of the jars, it is almost certain that they did not contain complete skeletons. The height of the jar ranges from 9-3/4 to 23-3/4 inches, and the diameter at the mouth is from 6-1/2 to 9-1/2 inches. The largest burial urn is therefore too small to accommodate the entire skeleton, and according to Sastri, any attempt to reassemble the contents of a jar to reconstruct the whole skeleton would thus prove to be futile.[23]

The jars with numerous bones clearly indicate how their contents were packed in. Generally, the skull was placed on one side in contact with the wall of the urn, while the long bones of the legs and arms were laid obliquely or horizontally intersecting one another. In many cases, the skull was placed in the centre or a little eccentrically, and the long bones stood erect. As a rule, one jar was meant for one individual; but in one jar (No. 3934) from Cemetery H, Stratum I, three skeletons were found.[24] And in several pots, the bones of two or more persons were found together. This was due to the fact that at the time of collecting the bones, after a normal period of exposure, the remains got mixed up and were inadvertently placed together. In this connection, jar No. H-149 from Harappa is particularly worth mentioning. It is round in shape and was found to be full of ashy earth freely mixed with pieces of charcoal, blackened potshreds and numerous fragments of charred and uncharred bones, including bones of a bird. Most of the bones in it were completely charred, some slightly calcined, while a few others bore no trace of fire at all. Many inferences have been drawn from this unusual phenomenon. Vats is of the opinion that the body was probably first exposed then partially burnt before being buried. But Sastri does not agree with this explanation, and he compares this feature with the memorial jar of the mature Harappa Culture which yielded animal bones and other sundry objects. He also suggests that the birds bones found in the jar may be that of a peacock, a bird associated with funeral rites and thought to accompany the spirit of the deceased as its guide in the journey to the solar world.[25]

The infants were buried in an embryonic position, probably wrapped in a piece of cloth before being placed in an urn in an inflexed condition. One elliptoid, one oval and nine round jars have been found which contained infants in an embryonic position.

At Kalibangan, pot burials were practised during the mature Harappa period. The pots exposed during the excavations did not, however, contain any skeletal material. Instead they contained beads, shell bangles and steatite objects. This feature has not been fully reported.

The Burial Pottery

The number of pottery vessels accompanying burials in Cemetery R-37 ranged from two to forty, with an average of fifteen to twenty vessels. The types were mostly the same as those found in one habitation sites of the mature Harappa Culture. An interesting feature of burial pottery was noted in the grave of a child, which contained miniature vases exactly similar in form and fabric to the larger pots usually found in adult graves.[26] The number of pottery vessels found in the cemeteries at Kalibangan and Lothal has not been mentioned in the preliminary reports. The same is the case with Cemetery H, Stratum II.

22 *Ibid.*, p. 2.
23 *Ibid.*, p. 5.
24 Vats, *op. cit.*, Vol. I, p. 211.

25 Sastri, *op. cit.*, p. 5.
26 *Pakistan Archaeology*, No. 5, p. 67.

The pottery found at Cemetery R-37 was extremely varied. As many as 45 main types, with no less than 175 variants of these, have so far been distinguished among the finds of 57 graves exposed prior to 1946.[27] The material excavated in 1966 showed eleven principal forms of plain ware.[28] Most of the funerary vessels found in Cemetery R-37 were identical in material, shape and decoration with the pottery collected from the habitation areas of Harappa and Moenjodaro. However, there are certain forms which make new additions to these collections and they cannot be compared with any types recovered so far from these two sites. The presence of this new element in the funeral pottery of R-37 may have been either due to the desire to provide for new fancied needs of the dead, or it may imply a phase of the Indus culture hitherto unrepresented in the habitation areas.

The pottery recovered from the burials at Kalibangan was typically Harappan. Whereas some of the pottery types, like the beaker, the dish-on-stand, the bowl and the round-bellied vessel, are common to both extended inhumation and pot burials, a few shapes were peculiar to each of these categories of burial.[29] In view of the limited evidence, this difference can hardly be overstressed.

The most outstanding characteristic of the funeral pottery of the two strata uncovered in Cemetery H is that it is entirely different in shape, texture and decoration from the pottery excavated in the habitation area. The vessels are made of well-levigated clay. They were fired to a deep red colour to give a shrill metallic ring when struck together. Similarly, the burial pots of the upper Stratum I and the small-sized funerary pottery of the lower Stratum II betray an entirely different ceramic tradition as compared to the secular pottery of the habitation areas collected from mounds A, B and F.

The pottery found in association with the earth-burials in Cemeteries H and R-37 was peacocks, goats, pipal leaves and plant motifs. Nevertheless, the concomitant pottery associated with Cemetery H, Stratum II, does not show symbols suggestive of a dead man's journey to the next world. The conception regarding the journey of the spirit to the next world does not seem to have been evolved in the time of Cemetery H, Stratum II. Among the painted designs on the pottery of Cemetery R-37, while the peacock and the pipal leaf occur, the goat is absent. Another characteristic feature is the bull, which is a common motif on the pottery of Cemetery H, Stratum I, but is not represented in Stratum II and also not in the pottery from R-37.

It is possible to infer that during the time of Cemetery R-37, the two motifs of peacock and pipal leaf, usually found on household pottery, had acquired a funerary significance. It is, however, important to note that besides the pipal leaf, other plants also occur on the pottery of R-37, which are absent on the funerary pottery of Cemetery H, Stratum II. In Cemetery H, Stratum I, a jar contained animal bones along with those of a child. The animal was perhaps the pet of the child, and was sacrificed to accompany him to the next world. This feature was also noticed in Stratum II of Cemetery H, where in six or seven earth-burials, the bones of sacrificed animals were noticed. With burial No. H-698 were found the bones of a sheep or a goat.[30] The rib bones of the animal were lying in the dead man's hands.

Animal bones were also found in some of the graves excavated in Cemetery R-37. One grave included the bones of a fowl together with a

27 Sastri, *op. cit.*, p. 43.
28 *Pakistan Archaeology*, No. 5, p. 68.
29 *Indian Archaeology* 1963-64—*A Review* (1967), p. 39.
30 Vats, *op. cit.*, Vol. I, pp. 220-221.

small handled lamp, both placed at the feet of the dead.[31]

Racial Characteristics

The skeletal material so far analysed does not lead to any conclusive evidence of the racial character of the prehistoric man of the Indus Civilization. Sewell and Guha, on the basis of their studies of the skeletal remains from Moenjodaro, have identified four racial types, namely proto-Australoid, Mediterranean, Mangoloid and Alpine.[32] On the other hand, D. K. Sen, infers that the population was homogenous with regard at least to the head-shape, the nose-shape and the stature.[33] Some archaeologists have also suggested that the population might have remained more or less static from the Harappan times to the present day. According to them, invasions of these regions must have been too small to bring about marked changes in the physical characters of the people.[34]

Conclusion

In the light of the latest researches, it can safely be presumed that the system of disposing of the dead in the Indus Civilization was inhumation. Unlike the burial finds at Ur, those in the Indus Valley do not so far contain any royal burials. The grave objects are usually of an inferior quality, and as such, suggest that the discovered burials are only those of the poor class of the Indus people.[35]

31 Wheeler, *Ancient India* (1947) No. 3, p. 86.

32 (i) R.B. Seymour Sewell and B.S. Guha, in John Marshall, *Moenjodaro and the Indus Civilization* (London, 1931), Vol. II, pp. 599-648.
(ii) John Marshall, *op. cit.*, Vol. I, p. 107.

33 D.K. Sen, 'Ancient Races of India and Pakistan—*A Study of Methods*' in *Ancient India* (1967), No. 20 and 21, pp. 178-205.

34 Wheeler, *The Indus Civilization*, p. 72. See also Matrio Cappieri, in W.A. Fairservis, *Roots of Ancient India*, (London, 1971), Appendix K, pp. 425-437, who does not agree with the accepted views of several anthropologists.

35 Wheeler, *Indus Civilization*, pp. 66-67.



Leaching Experiments to Eliminate Salt Effects at Moenjodaro

Ch. Rehmatullah

IN January 1964, a Unesco mission, headed by Dr. H. J. Plenderleith, came to Pakistan to study the excavated remains at Moenjodaro in order to evolve some method to save them from disintegration. After thorough study and consultation with national and international experts, the Mission suggested leaching tests to eliminate salts after the water-table had been lowered. For this purpose, a sprinkling technique was devised and adopted to leach out the salts.

The qualitative chemical analysis of the salts in the structural remains of Moenjodaro revealed that these salts included sodium and potassium chloride and sodium and potassium sulphate NaC1, Na2So4, Kcl, K2So4, in addition to calcium and magnesium carbonate and bi-carbonate. For the experiment, four pyramids designated A, B, C and D were constructed on separate plinths set at the corners of a 34 square feet area. The plinths were covered with bitumen to provide a damp-proof course to avoid the rise of the salts from the ground through capillary action. The salt-affected bricks and the mud-mortar used in the construction of these pyramids was very carefully selected from the site. While constructing these pyramids, the original thickness of the mortar used in the remains was kept in view. The pyramids were completed on 2 March 1965. The water used in the sprinkling experiments came from a water reservoir with a 200 cu. ft. capacity at a height of 20 feet from the top of the sprinklers. The top and the sides of the pyramids were sprinkled with water as uniformally as possible with a discharge of 1/40 litres/sec. The discharge of water was measured each time with a graduated cylinder and a stop-watch. The holes of the fountains were so arranged that the desired discharge of water should fall uniformally on the pyramids. The water was sprinkled for six hours on A and D and twenty-four hours on B. The pyramids A and D were respectively dried for six hours, and B for twenty-seven days. This cycle was repeated from March 1965 to November 1965. Water was not sprinkled on the control pyramid C and the changes were noted. The sprinkling of water started on pyramid B on the 4 March 1965. Sprinkling on Pyramid D was started on 8 March 1965 and continued at weekly intervals up to 14 November 1965. Sprinkling on A was started on 9 March 1965. The monthly observation of the changes in physical appearance of the bricks of the pyramids were recorded as follows:

March 1965

White salt appeared on the bricks when the pyramids dried after construction. The salt was more apparent on the mud. It crumbled to white powder if rubbed slightly with a finger. The sprinkling of the pyramids started in the first week of March 1965. The salt also appeared after the sprinkling of water when the bricks were dried.

April and May 1965

Mud mortar ran out from the core of the masonry of the pyramids through the joints thus weakening the structure to some extent. The sprinkling of water had affected the structure in spite of the thickness of the pyramids. It was also noted that the level of brick layers had been disturbed, and sagged particularly at the top of the pyramids. After sprinkling, the pyramids were allowed to dry; and white salt appeared in the early hours when the temperature was low. However, a small number of



1



2



3



4



5



6

1 As a result of sprinkling water, mud mortar has flowed out disturbing the brick layers and weakening the structure.
2 Control pyramid (c) not showing signs of deterioration, as the rise of ground water through capillary action has been stopped using the damp proof course.
3 Salts from the top layer brick SB has been leached out though not completely but this shows if complete leaching is possible then there is possibility of preservation of the remains provided water table is lowered down to a safe limit.
4 Top layer of bricks is completely sagged and salt crystals are visible from a number of bricks.
5 The salt is disintegrating the bricks and weak structure is visible due to the flowing out of mud mortar.
6 Continuous sprinkling of water has weakened the structure.

bricks also showed signs of deterioration soon after sprinkling.

May and June 1965

In advanced stages of the experiment, the following out of mud-mortar assumed an alarming form. It was noticed that several bricks had given way and were being pushed out of their original position. One encouraging aspect however, was, that the sodium sulphate, sodium chloride and sodium carbonate mixed with clay particles partially covered the surface of the bricks without spoiling the natural colour of burnt bricks. This was an interesting point, as burnt bricks are normally spoiled when the walls are covered with mud-capping. The hard incrustation was particularly deposited on the joints in the form of nodules. The high percentage of the salts, as indicated by quantitative analysis, may have an adverse effect on the bricks after some time, but so far no adverse effect was noted.

June and July 1965

The control pyramid C appeared to be in a better state of preservation but a small number of bricks disintegrated to powder if rubbed with a finger. Contrary to this, the bricks of pyramids A, B and D were rather consolidated with the reinforcing effect of their covering of salt and clay. It was however, noticed that a good deal of mud-mortar flowed out, and that the masonry did not remain as compact as it was when the pyramids were built.

July and August 1965

The general appearance of the control pyramid C did not show much deterioration. The complete leaching of the pyramids A, B and D had not been possible, as white salt, which on qualitative analysis proved to sodium chloride, sodium sulphate and sodium carbonate, appeared on pyramid B.

August and September 1965

The leaching out of salts proved to be more efficient at the top layers; and it was noted that they were in a better state of preservation, although they did not retain their original levels and the bricks were disturbed and sagged. The detailed extract analysis of ten brick samples chosen at the time of the construction of pyramids to give a representative sample is as follows:

Ca 5.5 Milli equivalents per litre.
Mg 1073 Milli equivalents per litre.
Na 3024 Milli equivalents per litre.
CO 10.92 Milli equivalents per litre.
HCO 21.32 Milli equivalents per litre.
Cl 1564 Milli equivalents per litre.
SO4 1427.76 Milli equivalents per litre.
Ph 9.25 Milli equivalents per litre.

Total soluble salts—6.90 (expressed in percentage).

October and November 1965

The very hard incrustation reported in previous observations in the summer was converted into white powder with the approaching winter. The salts just crumbled to white powder together with the red powder of the bricks even with only a gentle rub of the finger. This was the state of preservation of the bricks in the third week of November 1965. The salts were causing rapid disintegration in the bricks with the beginning of winter. The control pyramid C, did not show signs of such disintegration. The top-most layer of bricks in pyramid A was completely covered with white salt which caused such deterioration in these bricks that they were reduced to powder. Some bricks were still partially covered with the reinforcing material consisting of clay and salts. The physical change of the salts had just started. Some of the bricks were completely covered with white salts. The control pyramid C did not show signs of deterioration and not a single crystal of salt appeared on the bricks of pyramid C. The reason for this was that the rise of salts through capillary action was checked by the application

of the damp-proof course. The salt sometimes crystalized out of the bricks, as is clear on the third bricks from the right in the third course from the top. The leaching of salts was not yet complete, because a good quantity of salt was still oozing out of the bricks. The location of the sample bricks is clear from the plate showing the western and northern sides of pyramid C. The marking of the sample bricks was done in accordance with the Unesco Report.

The above operations reveal that, although the soluble salts were leached out, as is clear from the comparison of the analysis of the ten brick samples before and after the leaching experiments, the process of deterioration became severe as winter approached. The conclusion drawn from the experiment was that the sprinkling technique of leaching out salts is of no use. On the contrary, it accelerates the disintegration process of bricks, particularly when the salts become very mobile at a low temperature. The lowering of the water-table, which would stop the rise of salts through capillary action, could, however, be of much help in the preservation of these structures.

TABLE I

SUMMARY OF EXTRACT ANALYSIS

Lab. No.	Description	Milliequivalents per litre								EC X 10^3 at 25°C Saturation extract.	Total soluble salts % 1:15 suspension
		Ca	Mg	Na	CO_3	HCO_3	CI	SO_4	Cations Anions		
MC											
337/65	BM 3	2.22	3.33	159.49	10.30	7.21	81.50	66.00	165.00	15	0.60
338	DN 3	1.27	4.45-	1744.28	362.56	8.24	1066.40	312.80	1750.00	15	5.10
339	DS 4	2.33	3.54	1544.13	168.92	19.36	1072.28	28.90	1550.00	15	4.50
330	DS 6	2.66	2.38	1794.96	290.86	111.24	571.44	862.46	1800.00	15	5.20
341	EB 4	11.70	17.80	2318.33	Nil	11.33	1776.00	660.00	2347.33	15	7.00
342	EB 5	1.46	13.17	655.37	30.90	10.71	372.00	246.39	660.00	15	2.30
343	EB 6	1.57	1.81	746.62	78.62	18.13	466.00	187.00	750.00	15	2.80
344	SB 2	13.89	6.29	379.82	Nil	5.15	288.00	166.85	400.00	15	1.50
345	SC 4	26.77	6.77	721.46	Nil	15.45	392.00	347.55	755.00	15	3.10
346	SC 6	0.56	4.38	1695.06	319.30	56.65	906.00	418.05	1700.00	15	5.20
347	WB 3	1.58	2.58	1045.84	71.28	25.54	596.00	357.12	1050.00	15	3.20
348	WB 4	13.72	9.94	2326.34	Nil	4.59	1740.00	605.41	2350.00	15	7.20

TABLE II
SUMMARY OF BRICK ANALYSIS

Lab. No.	Description	Milliequivalents per litre Ca	Mg	Na	CO_3	HCO_3	Cl	SO_4	Cations Anions	EC X 10^3 at 25°C Saturation extract.	Total soluble salts % 1:15 suspension
MC	AM 2	0.56	0.74	318.70	31.11	12.24	123.00	153.65	320	15	1.22
504	AM 3	18.76	18.86	889.38	Nil	8.93	471.00	445.07	925	15	2.80
505	BM 2	20.16	8.13	366.71	Nil	3.16	193.00	198.84	395	15	2.00
506	CM 1	17.42	6.24	336.34	Nil	3.57	149.00	207.43	360	15	1.62
507	CM 2	0.84	2.02	372.14	13.26	22.19	163.50	176.05	375	15	1.65
508	CM 3	10.12	1.74	947.14	140.24	1.57	449.00	319.18	950	15	3.00
509	CS 3	0.67	1.82	837.51	73.85	21.22	383.50	361.43	840	15	3.20
510	DM 2	24.75	6.86	1318.38	Nil	5.15	818.00	526.85	1350	15	6.2
511	DM 3	1.68	3.10	465.22	3.50	7.31	210.00	249.19	470	15	1.95
512	EB 1	2.13	0.47	1148.40	71.71	25.57	582.6	470.58	1150	15	4.80
513	EC 2	24.92	22.40	1702.68	Nil	3.81	1233.00	513.19	1750	15	6.1
514	EC 3	0.84	2.70	796.46	66.54	24.41	332.00	377.05	800	15	3.00
515	EC 5	2.30	2.75	694.96	13.39	11.02	347.00	328.59	700	15	2.80
516		35.84	7.48	1806.68	Nil	5.15	1329.00	515.85	1850	15	6.30
517/65	NC 1	0.56	3.39	971.05	82.40	38.63	461.00	392.00	975.00	15	3.80
518	SB 1	23.63	9.13	2067.24	Nil	5.15	1708.60	386.25	2100.00	15	9.60
519	SB 4	23.44	16.82	2159.84	Nil	5.67	1747.00	447.33	2200.00	15	8.10
520	SC 1	Nil	2.08	1097.92	257.5	110.72	460.00	271.78	1100.00	15	4.20
521	SC 1	0.56	2.66	441.78	27.60	4.74	200.00	212.66	445.00	15	2.00
522	SC 4	20.61	5.39	839.00	Nil	8.24	434.00	422.76	865.00	15	4.40
523	SC 5	0.28	2.32	1897.40	319.3	39.14	1328.00	213.56	1900.00	15	6.30
524	WB 2	1.68	2.06	646.24	4.12	6.18	408.00	232.70	650.00	15	2.70
525	WC 1	28.28	7.50	2364.22	Nil	6.18	1828.00	565.82	2400.00	15	9.00
526	WC 3	24.64	6.04	969.32	Nil	5.77	498.00	496.23	1000.00	15	3.80
527	WC 4	1.12	1.90	996.98	103.00	3.50	542.00	351.50	1000.00	15	4.70
528	WC 5	0.28	2.84	946.88	132.87	41.71	511.40	264.02	950.00	15	3.70

TABLE III

SUMMARY OF BRICK ANALYSIS

Lab. No.	Description	Milliequivalents per litre: Ca	Mg	Na	CO_3	HCO_3	Cl	SO_4	Cations Anions	EC X 10^3 at 25°C Saturation extract.	Total soluble salts % 1:15 suspension
1	2	3	4	5	6	7	8	9	10	11	12
MC											
1134/65	AN 6	6.05	10.95	1083.0	Nil	5.0	638.5	456.5	1100.0	15	5.00
1135	DE 3	1.65	0.55	1297.8	153.6	60.2	572.5	513.7	1300.0	15	5.00
1136	DE 5	1.10	1.40	723.6	31.0	17.7	422.5	253.8	725.0	15	3.90
1137	DE 6	2.75	0.25	847.0	65.0	18.5	437.5	329.0	850.0	17	5.00
1138	DS 2	2.42	2.08	345.5	5.0	8.3	152.5	184.0	350.0	15	2.00
1139	DW 2	0.77	5.23	1194.0	42.0	30.0	722.5	405.5	1200.0	15	4.50
1140	DW 3	4.73	0.27	1795.0	101.0	74.5	1002.5	622.0	1800.0	15	
1141	EA 1	3.30	1.20	1945.5	188.0	90.5	1070.0	601.5	1950.0	15	7.00
1142	EA 2	1.87	0.43	1047.7	80.0	43.0	501.5	425.5	1050.0	15	
1143	EA 3	6.05	5.65	788.3	Nil	6.0	3463.5	330.5	800.0	15	3.60
1144	EA 5	1.10	3.40	596.6	18.0	42.0	347.6	195.0	600.0	15	
1145	EB 2	3.30	0.70	1646.0	12.0	11.0	797.5	829.5	1650.0	15	5.00
1146	EB 6					Consumed					6.00
1147	EC 1	18.70	8.30	1223.0	Nil	6.0	587.5	656.5	1250.0	15	5.20
1148	NB 3	19.25	3.95	801.8	107.2	42.9	376.5	298.4	825.0	15	2.80
1149	NB	1.10	1.90	597.0	17.0	10.5	316.5	256.0	600.0	15	4.10
1150	NB 6	3.85	0.15	996.0	111.0	34.0	467.5	387.5	1000.0	15	3.50
1151	NC 1	12.32	0.68	662.0	Nil	4.5	350.0	321.5	675.0	15	4.60
1152	NC 3	2.20	1.80	871.0	67.4	12.8	435.0	419.8	875.8	15	4.00
1153	NC 4	19.80	3.20	377.0	103.0	0.8	203.5	195.7	400.0	15	1.90
1154	ND 1	3.30	2.70	1244.0	16.0	12.5	1196.5	25.0	1250.0	15	4.10
1155	ND 4	2.75	0.45	1996.8	103.0	28.5	1312.5	556.0	2000.0	15	
1156	WB 1	29.48	13.52	1757.0	21.0	4.5	1227.5	568.0	1800.0	15	6.10
1157	WB 5	6.60	3.90	639.5	66.0	4.5	349.0	296.5	650.0	15	2.60
1158	WD 5	1.43	1.07	1097.5	21.0	6.4	585.0	487.0	1100.0	15	5.10
1159	WC 2	1.10	1.40	1248.5	166.0	36.5	667.5	380.0	1250.0	15	6.10
1160	SA 2	2.20	0.80	1097.0	58.0	23.5	494.0	606.0	1100.0	15	5.10
1161	NB 4	19.25	8.25	1472.5	Nil	4.1	822.5	673.4	1500.0	15	6.20
1162	DS 5	21.45	5.05	343.0	Nil	3.0	192.5	175.5	370.0	15	1.60
1163	NB 2	1.87	0.13	948.5	37.0	18.5	565.0	329.5	950.0	15	4.50
1164	NA 2	2.20	0.30	247.5	14.6	9.2	140.0	86.2	250.0	15	
1165	WC 2	1.65	0.85	1147.5	591.0	59.5	435.0	65.0	1150.0	15	
1166	AM 1	0.88	2.62	51.5	2.40	8.6	25.0	24.0	55.0	15	.32
1167	WA 4	1.54	0.46	673.0	48.4	15.2	477.5	113.8	675.0	15	4.00
1168	NC 5	1.10	0.40	1098.5	397.0	36.0	472.5	194.5	1100.0	15	4.50
1169	WA 3	17.60	6.32	586.08	Nil	3.8	336.5	269.7	610.0	15	2.60
1170	WN 6	4.95	1.29	243.76	Nil	1.6	148.5	97.9	250.0	15	1.10
1171	DN 2	2.20	0.40	1297.4	51.2	1.0	661.0	576.8	1300.0	15	4.70
1172/65	DM 4	0.88	0.89	1448.23	23.6	6.8	1026.5	393.1	1450.0	15	5.00
1173	SA 4	1.65	0.43	2247.92	252.0	68.0	1412.5	517.5	2250.0	15	8.30

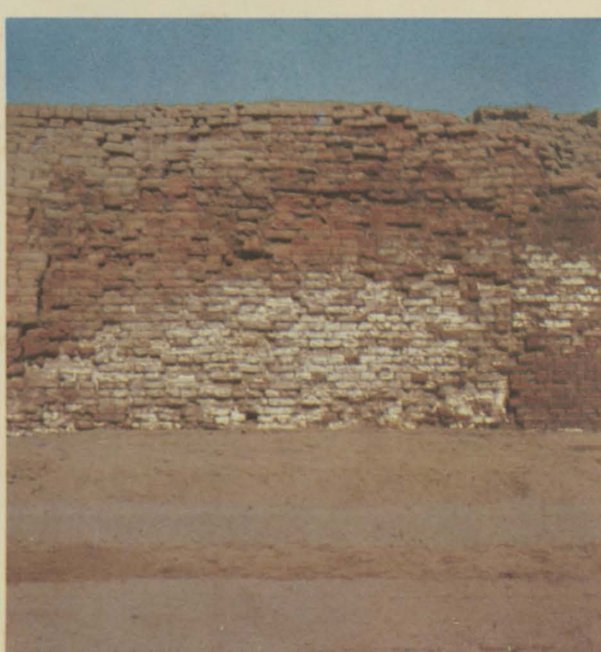
1	2	3	4	5	6	7	8	9	10	11	12
MC											
1174	EC 6	1.10	0.46	1248.44	96.0	19.8	603.5	530.7	1250.0	15	7.50
1175	DE 1	2.20	0.50	1997.3	54.8	17.2	208.0	1720.0	2000.0	15	5.10
1176	AN 3	1.20	0.50	1248.3	80.4	20.6	601.0	548.0	1250.0	15	6.10
1177	SB 3	2.20	0.92	896.9	60.4	13.8	695.0	140.8	900.0	15	5.00
1178	SA 3	7.70	1.98	940.32	3.0	3.0	525.0	419.0	950.0	15	5.20
1179	SA 1	0.99	2.44	1546.57	110.0	30.0	990.0	420.0	1550.0	15	4.30
1180	SA 6	32.45	10.19	1207.36	Nil	6.0	680.0	564.0	1250.0	15	5.20
1181	AN 5	1.10	0.98	997.92	42.0	9.0	579.0	397.0	1000.0	15	4.30
1182	WC 6	0.55	0.70	1098.0	86.0	8.0	567.5	438.5	1100.0	15	4.20
1183	DM 1	0.55	1.53	747.92	36.0	7.0	447.5	259.5	750.0	15	3.60
1184	DS 3	0.55	1.01	1448.44	78.0	13.6	820.0	538.4	1450.0	15	6.20
1185	AN 2	1.10	0.46	1498.44	196.8	82.6	740.0	480.6	1500.0	15	6.00
1186	DE 2	1.10	1.19	1197.71	62.80	62.80	731.0	394.2	1200.0	15	4.50
1187	WA 5	0.88	0.68	113.44	Nil	6.60	47.50	60.9	115.0	15	.70
1188	AN 4	0.55	1.01	1198.44	188.00	14.00	615.0	373.0	1200.0	15	4.50
1189	AN 1	2.20	0.92	396.88	288.00	36.00	705.0	391.0	1400.0	15	3.60
1190	EA 4	1.65	0.43	1447.92	163.2	308.00	825.0	481.0	1500.0	15	9.10
1191	SB 6	1.10	0.98	1297.92	151.2	31.8	627.5	490.0	1300.0	15	5.30
1192	DS 1	1.10	0.98	1097.92	78.00	16.0	670.0	338.0	1100.0	15	5.10
1193	SB 5	1.65	0.74	1047.61	18.0	00.0	620.0	410.0	1050.0	15	2.10
1194	DN 5	0.55	1.01	398.44	16.0	6.0	245.0	133.0	400.0	15	2.50
1195	DW 6	0.88	0.37	1098.75	80.0	13.0	675.0	332.0	1100.0	15	4.00
1196	DE 5	1.10	0.77	1498.13	120.0	24.0	752.5	603.5	1500.0	15	5.10
1197	DE 4	0.22	1.34	1548.44	92.0	23.6	1140.0	294.4	1550.0	15	5.00
1198	NB 1	0.55	2.57	1746.89	20.8	19.6	1145.0	564.6	1750.0	15	
1199	DM 1	9.68	3.01	122.31	Nil	4.0	55.00	76.0	135.0	13.5	.72
1200	DE 6	0.88	0.37	948.75	110.0	32.0	535.0	273.0	950.0	15	3.40
1201	WB 6	1.65	0.22	748.13	64.0	21.0	342.5	322.5	750.0	15	3.60
1202	DN 6	0.44	0.39	1149.17	150.0	18.0	655.0	327.0	1150.0	15	4.60
1203		1.65	0.12	1148.23	18.0	15.0	700.00	416.0	1150.0	15	4.10



Stupa Mound



Crumbling under the effects of salts.



Scourge of Salts due to rise in water-table

PART ONE

SECTION II: SUMMARY OF PAPERS

Kot Diji and Moenjodaro

M. A. Halim

SINCE the recognition of the Harappa Culture in 1924, large-scale excavations at Harappa and Moenjodaro were conducted by Sir John Marshall and his associates, which revealed the remains of a highly developed urban culture of the Bronze Age, with a developed system of town planning, uniform cultural traditions and a mature ceramic industry. Subsequent discoveries of a number of sites, with similar Harappan traditions, along the Indus River and its tributaries gave it the name of the Indus Valley Civilization. Fresh discoveries have further extended the distribution pattern of these settlements, extending beyond the Indus system along the Mekran coast in Pakistan and also in Kutch and Gujerat in India. The discoveries made so far have proved that Harappa and Moenjodaro were the greatest towns of this widely distriubted culture of the South Asian Subcontinent. Harappa had been subjected to great depredations in modern times. Its buildings have been deprived of bricks by local villagers and by a railway contractor, Brunton, who supplied the bricks from the ruins of Harappa for use as ballast in the railway track being laid from Multan to Lahore in 1856. Moenjodaro remained intact till its discovery by archaeologists. Therefore, the excavations at Moenjodaro presented an undisrupted picture of the cultural aspect of this highly developed civilization. It is now known that about c. 2371 B.C. the Harappans possessed a highly developed agrarian culture, showing the presence of regular town planning, public institutions, an individual style of pictographic writing and a high degree of artistic ability and craftsmanship, as reflected by various types of antiquities and also by signs of religious and burial practices. The cities of the Harappa culture, as indicated by the ancient remains of Moenjodaro, were well planned and built with burnt bricks. The city was laid out on a chess-board pattern, with broad parallel streets crossing each other at right angles to divide the city into compact rectangular blocks. The residential houses were solidly built, with blank outer walls facing on the streets. The Harappan had an elaborate system of drainage. Along the streets covered brick drains were constructed to receive the refuse water from the houses. The covered drains were also made to carry the flood water from the city. It shows the Harappans' high concern for sanitation and hygiene. The excavations at Harappa in 1946 and at Moenjodaro in 1950 revealed that the large cities of the Harappan period consisted of two parts: (i) a citadel, and (ii) a lower city. The citadel area was massively fortified. The fortification wall was built with mud bricks and revetted externally with burnt bricks. The wall was also provided with rectangular bastions at frequent intervals. Other fortified settlements of the Harappans are located at Lothal in India and Ali Murad and Sutkagen-Dor in Pakistan. The public buildings of the Harappan culture were their great granaries, baths and a large pillared hall.

The Harappans possessed a distinctive style of pictographic writing and a high degree of artistic craftsmanship, as can be seen from a great number of seals and sealings found at Harappa, Moenjodaro and at other Harappan sites. The pictographic characters, best known as the 'Indus script', are still undeciphered. The plastic art of the Harappans is best illustrated by the steatite seals bearing lifelike representations of animals. Figural art was equally developed and is well represented by terracotta female

figurines and models of animals and birds. Many of the female figurines are taken to represent the 'mother goddess', whose cult was widespread in South Asia and the near Middle East. Among the works of figural art, the steatite bust of a King-Priest and the figure of a 'dancing girl' in bronze are the best and most realistically portrayed. The personal ornaments of the Harappans were made of gold, copper, shell, ivory, faience, steatite and semi-precious stones. Stone objects of the Harappans include micro and long chert blades. The Indus Valley Civilization possessed a highly mature pottery industry of its own. The ceramics of the Harappans during the entire period of its occupation in the Indus Valley remained static and uniform. The Harappans had a large variety of wheel-made pottery of red ware. Both plain and painted ware, ranging from large storage jars down to a variety of household utensils and tiny cosmetic containers, were produced. The main types of such ceramics included the dish-on-stand, cups, beakers, goblets, water pitchers, heavy storage jars with pointed bottoms, jar covers and perforated long cylindrical burners. The decorations on the Harappan ware show a mature standardized uniformity. The painted designs are executed in black-on-red slip and consist of geometrical and foliated patterns, such as interlocking circles, comb and scale motifs, chess board patterns, pipal leaf designs. Animal and bird representations such as of peacocks and antilopes, with hatched body on ceramics, are also common finds of Harappan sites. Copper and bronze were also used for domestic utensils, implements and ornaments by the Harappans. The excavations at Moenjodaro and at the contemporary sites at Kish and Ur in Mesopotamia have brought to light some related material of each culture, which indicates long distant trade connections between the two ancient civilizations.

Through the large number of material remains recovered as a result of excavations at Moenjodaro, Harappa and other Harappan sites it is now evident that the Harappans arrived in the Indus Valley with mature and uniform cultural traits which dominated the Indus plain for a long time. But the beginning of this highly sophisticated cultural pattern is still unknown, and we lack the knowledge to trace the emergence of the Harappan in the Indus Valley. The problem of the origin of Moenjodaro requires probing into the earliest phases of the Harappan culture. Since the sites situated in the east and south-eastern part of the Indus Valley represent the later expansion period of the Indus Valley, it becomes vital to excavate the lower levels of Moenjodaro, which might then produce a tangible answer to the problem. But the problem of the high water-table has continued to frustrate any attempt made in this direction. In 1950 Sir Mortimer Wheeler tried to excavate the waterlogged lower levels of Moenjodaro near the citadel area, and he, too, was unable to continue with this undertaking. However, in his excavations some early stages of the development of ceramics were observed, although these finds were insufficient indications of the nature of the early stages of Harappan culture. In 1964, Dr. George F. Dales carried out test borings at Moenjodaro, and revealed signs of human occupation up to 39 feet below the present ground level. This indicates that half the life-span of Moenjodaro is still unkown to the world.

Since all efforts to reach the earliest occupational levels of Moenjodaro were foiled by the waterlogging problem, it became pertinent to pursue relevant queries farther afield at other ancient sites in the Indus basin. The excavations at Kot Diji provided a great deal of help in understanding the cultural conditions which existed in Pakistan prior to the Harppans. Now the evidence is forthcoming that the process of urbanization in Pakistan started much earlier than the emergence of the Harappan in the Indus Valley. New discoveries of sites with Kot Dijian

material in Bahawalpur, the Punjab and NWFP present a new picture of a widely distributed pre-Harappan Culture. The Kot Dijians, as we know today, were not less civilized than the mature Harappans of the Indus Valley.

Here it seems necessary to review the new picture of the Kot Dijian culture which has emerged through recent archaeological discoveries. In 1946, a distinctive type of pottery was found below the defensive wall of the mature Harappan culture at Harappa. But no serious attention was paid to this then, as there was no relative material anywhere in the sub-continent. The new ware was considered 'alien' to the Harappans. Nine years later, however, the real significance of this alien pottery as a distinctive cultural element was established by the excavations at Kot Diji in the Khairpur District of Sind. The excavations at Kot Diji were conducted to investigate the nature of a small outlying Harappan settlement, situated away from its great urban centre of Moenjodaro on the south-eastern expansion route of the Indus Civilization. The excavations revealed the Kot Dijian cultural element superimposed by the remains of the later settlement of the mature Harappan culture.

At Kot Diji, the upper levels from (1) to (3) represent a mature phase of the Harappan culture. The underlying 17 feet thick cultural deposit (4) to (16), separated from the superimposed Harappan levels by a thick layer (3A) of charred material, represents the earlier culture of the Kot Dijians. An interesting feature of Kot Dijian culture is the properly oriented, massive fortification wall of sun-dried bricks, of which the defensive wall is built with undressed lime-stone in the lower part and in its upper part with mud bricks. Internally, the fortification wall is reinforced, by a stone revetment bonded with its foundations. Externally, the defensive wall is provided with a mud-brick facing and massive bastions at intervals. The distinctive features of the Kot Dijian ceramics are fine thin bodies, short beaded or slightly everted rim, fugitive broad bands around the neck in red, brown, sepia or warm black. Its clay is well-levigated and the ground varies from a pinkish to a red colour. The principal forms of the Kot Dijian pottery include flat-based globular or squat vessels of medium size with a short beaded rim; squat and long types of dish-on-stand; flat-based and straight-sided cylindrical vessels and bowls; shallow plates of thin fabric; beakers; jars and knobbed lids. Kot Dijian finds of small artefacts include fine micro and long blades, terracotta cakes, cones, bangles and beads. Kot Dijian pottery is easily recognized by its distinctive features, which remained basically unchanged from the beginning to the end of its settlement. However, with regard to decorative design an evolution in Kot Dijian pottery painting has been observed.

Chronologically, the Kot Dijian occupation started much earlier than the mature Harappan settlement at Kot Diji and elsewhere in the Indus Valley. This has been confirmed by two radiocarbon dates available from the lower level (14) and last Kot Dijian level (4) in the citadel mound which fall between 2605 ± 145 and 2090 ± 140 B.C., respectively, when calculated on half life of 5730 years. If we were to add another two of the earliest Kot Dijian levels (15) and (16) to the life-span of Kot Dijian culture, it would mean that Kot Dijian occupation started at Kot Diji on the bed-rock in about c. 2700 B.C. and lasted till the end of the third millennium B.C.

The Kot Dijian culture, as known from the type-site of Kot Diji, has been found widely distributed at a number of sites located at Paiojodaro and Rajodaro in Sind; Bhoot and Kudwala in Bahawalpur; Jalilpur in Multan; Kholâ and Pind Naushahri near Taxila in Rawalpindi; Jhang and Khunda in Campbellpur;

Musa Khel in Mianwali; Gumla, Rahman Dheri, Hathala, and Karam Shah in Dera Ismail Khan; and at Leiah. In India, Kalibangan I is reported also to have revealed a Kot Dijian type of pottery. Here it will be interesting to note that at Sarai Khola, Jhang, Gumla and Jalilpur in the northern and central parts of Pakistan, signs of Kot Dijian culture have been found in association with those of earlier cultures possessing handmade pottery traditions. Though Kot Dijian culture appears in its mature form at Kot Diji, it is not possible, at present, to say precisely at which of the sites named above it first came into existence.

The general pattern of Kot Dijian culture before the emergence of Harappans in the Indus Valley shows a well-developed, system of fortifications, as indicated by the excavated remains at Kot Diji. There is every possibility that similar features would be encountered if other sites—namely, Rahman Dheri in D. I. Khan and Jhang in Campbellpur District —were excavated. Indication of the trade relations of Kot Dijians have been provided by the presence of lapislazuli at the excavated sites of Sarai Khola and Jalilpur. The presence of typical female figurines at Gumla, Sarai Khola and Jalilpur indicate a well-developed religious aspect. Kot Dijian ceramic traditions were common and uniform, as indicated by the uniform ceramic wares found at widely distributed sites. Thus we may contemplate that, before the emergence of the Harappan in the Indus Valley, a widely spread Kot Dijian culture had already passed through its elementary stages towards full urbanization within the borders of Pakistan. Unfortunately, we still do not have sufficient evidence to indicate how this major transition from one culture to another, i.e. Kot Dijian to Harappan, came about, and what factors were responsible for this change in the cultural pattern of the Indus Valley.

Currently, on the basis of similarities in architecture and in certain ceramic types, it is thought by some that the Harappan culture was influenced by the Kot Dijian, and may indeed have evolved out of it. Although, similarities certainly exist—in architecture, ceramic types and other minor objects like the dish-on-stand, shallow wide plates, flared mouth beakers, terracotta bangles, beads and triangular cakes these similarities are at present so limited that the acceptance of theories about their relationship presents difficulties, Wherever remains of Kot Dijian and Harappan cultures are found at the same site, the stratigraphical evidence shows that there is a complete and decisive break in the sequence of settlements. At Kot Diji, the layer (3A) marked with charred material completely sealed the earlier phase of a Kot Dijian settlement. Above this layer (3A), the finds of a mature Harappan culture indicate the beginning of the new and alien settlement of Harappans, with completely diverse cultural traits. Regarding this break in the cultural sequence at Kot Diji, Dr. F. A. Khan remarks: "This prominent and clearly marked burnt layer strongly suggests that the last occupation level of the early settlers (that is the Kot Dijians) was violently disturbed, and probably totally burnt and destroyed. The sudden disaster was indeed connected with the movement of newcomers into this part of the country. Who are they? Undoubtedly the Harappans, whose abundant relics in the superimposed upper levels leave no room for doubt about their identity."

Similar evidence is found at Gumla. Gumla III, representing Kot Dijian cultural traditions, was destroyed by new arrivals at Gumla IV—the Harappans. Dr. A. H. Dani observes: "The end of this period (III) appears to be violent. There is a thick layer of ash, charcoal, bones, potsherds etc., which all belong to Period III. This thick ashy layer separates the structure of Period III from that of Period IV. But there does not seem to be any gap between period III

and IV. The reoccupation of the site must have started soon after destruction".

To sum up, the Kot Dijians, prior to the arrival of the Harappans in the Indus Valley, had already formed a well-developed, uniform and widely distributed cultural pattern of their own, and had passed the early stages towards full urbanization in the South Asian subcontinent before their magnificent culture was destroyed by the Harappans, who had no common cultural traits with the Kot Dijians, except for a few pottery types and some simple architectural features and decorative motifs.

Architecture of Moenjodaro

Niaz Rasool

ARCHITECTURE, like many other arts, has developed from a primary requirement of human life. Before considering the architecture introduced by the people of Moenjodaro, it is necessary to make a brief evaluation of the architectural achievements of their predecessors. The resultant comparison will in fact help us to arrive at a much realistic appraisal of the architecture of the people of Moenjodaro. Leaving behind the old stone age in the Soan Valley near Islamabad (c. 500,000 years ago), where we have no signs of any building activity, we come down to the pre-historic villages in the Baluchistan Hills (c. 5000 B.C.). Here we find that the people developed an agrarian society and sheltered themselves in houses which were constructed simply with mud bricks. The excavations at Kot Diji in the Khairpur Division of Sind have brought to light the beginnings of a well-defined architectural style. The most impressive structural remain at Kot Diji is the defensive wall of the citadel, which is of a considerable height and width. Raised on bed-rock, it is built with roughly hewn stone blocks with a superstructure of mud bricks. The dwelling-houses of the Kot Diji people, though small in size, are constructed with undressed stone foundations, while the superstructures are raised with mud bricks.

Such was the simple and plain architecture which was in vogue before the people of Moenjodaro evolved one of the greatest civilizations of the world, known as the Indus Valley Civilization. The discovery of Moenjodaro, and archaeological site of high potentiality, dating back nearly five thousand years, in the District of Larkana in 1922 opened a new chapter in the study of ancient architecture. While the interesting and indeed amazing material unearthed at the site speaks eloquently of the advancement of the people of Moenjodaro in every sphere of activity, the structural remains, though devoid of any ornamental work, surpass all other achievements. Here, at the metropolis of the Indus Valley Civilization, a large area of the site exposed by the archaeologist's spade contains dwelling-houses.

The buildings produced by the architects of Moenjodaro are very simple, but this simplicity, together with the quality of the construction and the materials used in it, has its own charm and grandeur. The methodical planning of the city site and the remarkable network of its drainage system are the main characteristic features of Meonjodaro's architecture. Sir John Marshall, who was the pioneering excavator of Moenjodaro, emphasizes the advanced nature of the architecture planning of the dead city in the following words: "Anyone walking for the first

time through Moenjodaro might fancy himself surrounded by the ruins of some present-day working town of Lancashaire". Sir Mortimer Wheeler further remarks that the planning of the main street of the city reminds us of New York's Broadway.

The architecture of Moenjodaro differs in many respects from the architecture of other contemporary civilizations of the world. Here, at Moenjodaro, one can see the extensive use of rectangular burnt bricks of excellent quality and of equal size, whereas in the ancient ruins of Egypt burnt bricks have been used rarely, as the people depended much more on the use of stone. Even in early Sumer, the plano-convex shape of the brick is somewhat irregular. It is rectangular and thin, with a flat base and sides and a rounded surface. The architecture of the ancient people of Babylonia and Egypt shows some examples of the true arch; whereas it seems that the people of Moenjodaro only utilized the corbelled arch in their buildings. Similarly the round column was well known in Sumer, but we do not find any example of it at Moenjodaro. When columns were required, they were always made either square or rectangular in section. Since timber was available in abundance at Moenjodaro, it is quite possible that its people might have used wooden columns. The people of Moenjodaro built most of their important buildings with batter walls, whose outer faces have receding slope from the ground upwards. This style of architecture was not known in early Babylonia, but was frequently utilized in Egypt. The buildings of Moenjodaro testify to the fact that the builders did not use any ornamentation. So much so that the walls of houses are quite plain, and the interiors of buildings show the same complete lack of decoration. The beauty of the Moenjodaro architecture lies precisely in its functional simplicity, since the buildings have been constructed to suit the requirements of the people. It may also be inferred that there was not much difference in the living conditions of people. Had there been marked distinctions in the Moenjodaro society, as seen in other civilizations contemporary with it, the style of architecture would also have varied. In fact, all the buildings of Moenjodaro bear the same mark of complete utilitarianism.

Most of the structural remains at Moenjodaro consist of dwelling-houses, which though they vary in size, share the same basic architectural features. The smallest of the houses has two rooms, while the largest contains as many as ten rooms or more. The houses are so aligned with the main streets, running approximately north-south and east-west, that their doors open on side lanes, and never on the main streets. Keeping in view the requirement of an open courtyard in those days, the rooms have generally been arranged on the four sides of a central court. As already pointed out, the houses have been constructed with a fine quality of bricks laid in mud-mortar. However, a mud and gypsum mixture has occasionally been used for surfacing or at the corners of buildings, in order to strengthen their structure. The masons have used two techniques of brick-laying. In one, we find headers and stretchers arranged alternately in the same course, while the other shows an entire course of headers alternating with an entire course of stretchers. These two techniques are today distinguished as 'Flemish' and 'English' bonds, respectively. Two other characteristic features of the dwelling-houses are notable: the construction of their bathrooms and their drains. Special care has been taken in the construction of bathrooms with the apparent object of making their floors watertight by using well-polished bricks. The drains descending from the upper storeys have been constructed in the thickness of the walls and connect with the main drains of the lanes. The rooms of the houses are floored with three different materials, *viz.* beaten earth, sun-dried brick or burnt brick. The first is very common, but the remaining two have also been used occasionally. As regards the

provision of windows, it appears that this architectural feature was a rarity in Moenjodaro, because only a few example of windows have been found so far. Excavated remains further reveal that apparently most of the houses at Moenjodaro were double-storeyed. The stairways leading to the upper storeys are very steep and narrow. We have sufficient evidence to infer that the roofs of the houses were flat and rested on wooden rafters.

Besides the dwelling-houses at Moenjodaro, there are some other remarkable features of this city site which deserve special mention. Prominent among these are the elaborate drainage system which is spread over the whole of the city, the public wells and baths and the Great Bath. The street drains of Moenjodaro are all of the same general type, and have been constructed with burnt bricks. Most of them were covered with the usual burnt bricks, but in some cases where the drains were wider, they had to be roofed with stone slabs. In other cases, the drains are so very wide that it must have been found impossible to bridge them even with stone slabs. This difficulty was overcome by closing them with corbelled roofs. It is interesting to note that some of the drains have been given a gradual bend at turning points, in order to allow the water to flow without the obstruction of acute bends.

Similarly, a number of public wells of various diameters have been found at Moenjodaro. Special care seems to have been taken in the construction of these wells, as the bricks used in them, though of different sizes, are almost invariably wedge-shaped. Particular attention was also given to the flooring of the public baths, which are a common feature in Moenjodaro. Fortunately, these floors are also better preserved than those of ordinary floors in the houses. In the construction of bath floors, sawn bricks have generally been used to ensure an even surface. In some places the brick surface of these floors is found coated with a dark red coating resembling an enamel, the nature of which has yet to be determined. It is certainly not a glaze, for it is comparatively soft.

Among the public baths, the Great Bath, about 35 feet long, 23 feet broad and 8 feet deep, with a flight of steps at either end, is a fine example of the architecture of this period. It has a large tank, with verandahs on all four sides, and at the back of three of the verandahs, there are galleries and rooms. The bricks used in its construction are exceptionally good in quality, and they are laid in gypsum-mortar. Moreover, every possible precaution seems to have been taken to make its walls and floor watertight by using a course of bitumen.

The architecture produced by the people of Moenjodaro probably possesses many more aspects and features yet to be discovered, as so far only one-third of the area of the site has been exposed and the rest remains buried. There are sound reasons for our not having gone ahead with further excavations at the site. Soon after the excavations carried out from 1922 to 1927 widespread salt encrustation on the structural remains was noticed, which was due to the fact that the water-level had risen by several feet. With the passage of time, the exposed remains were affected by waterlogging and salinity, further aggravated by the change in the course of the River Indus. Due to these menaces, the condition of the remains deteriorated rapidly. According to H.J. Plenderleith, "if nothing is done to preserve them, all the existing excavations will crumble within the next twenty to thirty years, and one of the most striking monuments of the dawn of civilization will be lost for ever".

The Department of Archaeology, Pakistan, with its limited resources, adopted various measures to check the deteriorating condition of the remains, but these methods did not pro-

vide a permanent remedy. In 1960, the Government of Pakistan opened negotiations with the UNESCO for the preservation of the world-famous site. It is a matter of great satisfaction to find that members of the UNESCO Mission, after examining the site again in 1972, have approved a scheme of 8.23 million in order to protect and preserve this unique heritage of mankind. It is expected that the work on this project will be started soon. The time is not far distant when the thick layers of earth covering a large portion of the city will be removed by the archaeologist's spade, and thus reveal a fuller picture of the ancient metropolis.

Jewellery from Moenjodaro

Masood-ul-Hasan

PERSONAL adornment of human beings is an inherent desire from times immemorial. Primitive man adorned himself with ornaments fashioned from dried grass, stalks of creeping plants, bones of animals, the plumage of birds, and shells and seeds of many colours. His next step was perhaps to carve in wood and bone and make rude immitations of the natural ornaments he had before been accustomed to wear. Then he imitated the twisted grass, using gold and silver and copper wire, and made immitations of fruits and seeds using metal sheets soldered together. His religious ideas and objects of worship afforded subjects for his imagination, and he then began to devise original forms in chasing and repousse work.

This was perhaps the time when Moenjodaro and Harappa, twin cities of the Indus Valley Civilization, were enjoying a most advanced pattern of life. Excavations in these cities have revealed that the people were not only good town-planners and agriculturists, but were also good craftsmen. Their skill is very well demonstrated in the making of seals, bronze figures, toys, gamesmen, implements and jewellery found here. The jewellery unearthed from Moenjodaro consists of ornaments used by all classes alike: necklets, fillets, armlets, finger rings and girdles, ear-rings and anklets. Men probably wore rings, and perhaps anklets too. These ornaments show that the Indus Jeweller had a long tradition of the craft, which he pursued with imagination and dexterity.

Beads have been freely used in the ornaments of Meonjodaro. Strung beads were worn as armlets, bracelets, necklaces and girdles, as some beautiful specimens of these types of ornaments have been found at Moenjodaro. The beads vary in both form and material. Materials include gold, silver, copper, faience, steatite, semi-precious stones, shells and pottery. Although no remains of a bead-making industry have yet been found at Moenjodaro, finds of unfinished beads suggest that the jewellers of Moenjodaro knew how to design and make beads. At Chanodaro remains of the shop of a bead-maker have been found, where bead-making and the sawing, flaking and boring of stone-beads was apparently carried out. In the opinion of archaeologists the technique was both laborious and skilful. Agate or carnelian was first sawn into oblong bar, which were then flaked into my cylinders and polished, and finally bored with either a chert or a bronze drill. The techniques of boring bear some affinity with those used at Ur in Mesopotamia.

A jewellery hoard found in the H/R area at

Moenjodaro contained gold ornaments kept together in such a way that it seemed they might have been the property of goldsmith. From this hoard came a necklace of green Jadeite beads with gold discs used as spacers between the beads. These disc beads are made with two discs soldered together with a diametric channel for passing the string. The use of these gold discs as beads afford a striking example of the skill of the Moenjodaro jewellers. This form is copied in faience and is identical with that of certain Sumerian beads of the early Dynastic III—Akkadian period (c. 2500-2300 B.C.) found at Troy II J and dated c. 2300 B.C.

Other metal beads of silver, copper or bronze are of a simple globular or cylindrical form.

Among the faience beads, another interesting form is that of the segmented bead. This type of bead has also been found at Tell Brak belonging to the Jamadat Naser period (c. 3000 B.C.).

The steatite beads appear to have been fairly common in Moenjodaro. These were cut out or moulded from a paste made of ground stone. The usual colour of the head is white, and it is decorated with a trefoil pattern with barrel or convex bicone shapes. A trefoil pattern was also used in Mesopotamia after the Sargonid period (c. 2300 B.C.), and a thousand years later in Egypt.

The stone beads used by the Moenjodaro people are usually made of agate though some carnelian beads of cylindrical or barrel shapes are also in-evidence. Disc beads are rare, whereas in Sumer and Egypt they are very common in the early periods. At Moenjodaro these stones were apparently regarded as very valuable, since we find many examples of cylindrical and barrel shaped beads having been reused after being broken. Decorated carnelian beads were also used by the Moenjodaro people. The decorated patterns include an 'eye' design, a figure of eight, and a very elaborate design consisting of nine compartments, one in the centre and eight round it. Such beads have been classified in three types: one with a white pattern on a natural red background; another with a black design on a white background; and a third with a white design on a black background. These types of carnelian beads are also found at Kish, Tell Asmar and Ur in Mesopotamia and at Hissar III and Shah Tepe in north-eastern Iran. Other stone beads known to the Moenjodaro people were jade, lapis lazuli and jasper, which are rare and might have been imported from Sumer and Persia.

Terracotta beads have been found in large quantities at Moenjodaro. Some have a red iron-oxide slip, imitating the carnelian, others have a cream slip or none at all.

It may be presumed that beads might have been a measure of the wealth and status of a person in the society of those days, as precious stones and jewellery are in our own age. Beads of untreated stones, pottery, shell and paste may have been within the reach of the common people, while the beads of decorated carnelian, glazed steatite, gold or silver probably used only by the rich.

The use of ornaments, made of either beads or metal or other materials, by the women and men of Moenjodaro have also been identified through their appearance on figurines of bronze, terracotta and stone. The female figurines indicate that the women of Moenjodaro liked to adorn themselves with ornaments from head to foot. Ornaments used for various parts of body are briefly described below.

Head Ornaments: On their heads the women used fillets to adorn the hair. These fillets were made of gold, silver or copper in bands of a width of about half an inch. The fillet was either straight, conical or arched.

Measuring upto 16 inches in length, it usually had two holes at the end to fasten it. Cones with a loop of wire inside the apex to secure it were probably also used on the head. Other adornments for the head were hairpins with ivory figures of animal heads attached to copper, bronze and bone pins.

On the forehead, an ornament similar to the *jhoomar* of the women of Kathiawar today, was worn.

Ear Ornaments: The terracotta figurines found at Moenjodaro show some ear-pendants, but no ornament of the ear with a definite identification has been found in Moenjodaro. Faience studs consisting of a disc and a plain knob at the back have, however, been found at Moenjodaro, and these are thought to be ear-tops.

Nose Ornaments: Since no terracotta or stone figurine is represented as wearing nose rings or studs, we must presume for the present that this ornament was not worn by the women of Moenjodaro.

Neck Ornaments: The mother goddesses found at Moenjodaro are represented as wearing necklaces of various sizes, some tight around the neck, some hanging down to the breasts, and still longer ones hanging down to the stomach. These were certainly made of beads of various materials. A specially beautiful example of a necklace was found in the H/R area. The famous 'dancing girl' is wearing a necklace with three leaf-shaped beads. Amulets were perhaps worn by both the sexes in Moenjodaro.

Girdles: This ornament was worn by Moenjodaro women around the loins as shown in the terracotta figurines. This seems to have been a favourite ornament of the women of Moenjodaro. Some fine examples of it found in the D/K area are composed of several strings of long tubular beads of carnelian with bronze or copper spacers in between the beads, and D. shaped terminals at both ends, on which traces of gold are visible. The boring of the beads shows a high degree of technical skill. Women of smaller, means apparently used cheaper girdles of terracotta beads. The longest girdle found at Moenjodaro is 3 feet 4 inches long.

Arm Ornaments: The figurine of the 'dancing girl' shows that the use of bangles from wrist to armpit was practised by at least some Moenjodaro women. The left arm of the dancing girl is fully encased with bangles, while on the right arm she is wearing bangles only on the wrist and on the elbow. The material of these bangles may have been of ivory, as it would have been difficult to move the arm freely with a load of metal. This type of adornment is still to be found in the Tharparkar District of Sind, where Kohli or Bhil women use bangles of a wax alloy from wrist to armpit. Moenjodaro bangles sometimes have circles of red paint on the exterior surface, perhaps to imitate jewels.

The bracelets of Moenjodaro are made of gold, silver, bronze, copper, blue glazed faience shell or pottery. A fine specimen of a bracelet found at Moenjodaro consists of six strings of hollow globular beads. In this bracelet, after every seven beads, six strips of beaten gold with six holes for strings to pass through have been used. It has two terminals at the ends: one with six holes, and the other with only one. The silver bracelets are made of wire foil, while ordinary terracotta bracelets and bangles are hard baked and usually coloured black or chocolate brown on the outside and dark or light grey on the inside.

Hand Ornaments: Finger rings of copper or bronze have been found in considerable numbers, suggesting that these were popular ornaments among both sexes at Moenjodaro. The copper or bronze rings are of two types: (a) simple bands of round or strip wire, (b) rings

of spirally coiled wire, which seems to have been more popular. No gold ring has been found at Moenjodaro. A silver ring, shaped as a flat square adorned with a geometric cross pattern, has been found. Rings of silver were well known in Sumer during the Moenjodaro period. Other rings sparsely found at Moenjodaro are made of faience and steatite. The steatite ring has trefoil pattern.

Foot Ornaments: A little bronze foot and a stone statue found at Moenjodaro suggest that anklets were worn by men as well as by women. The bronze foot seems to be that of female wearing a *Kara*; and the stone statue is that of a male wearing a broad band of pittings on the ankles. The first mentioned anklet is most interesting, for its curve resembles that of the anklet of a figure in fresco at Knossos. This type of *kara* is still worn by the hill-women of Simla.

Anklets were also worn in Egypt in 2500 B.C., as example of these have been found in the tomb of Hetepheres, an Egyptian queen. Moreover some anklets of strings of minute gold beads found in Egypt date back to prehistoric times.

The use of the ornaments described above shows that the women of Moenjodaro, rich or poor, had the same desire to bedeck their persons with jewellery as those of today have. Furthermore, the basic designs of the ornaments produced some 5,000 years ago are still found in Sind today, especially in villages, although the materials used have changed, and the use of metal is predominent. Jewellery was as valuable a property in the days of Moenjodaro as it is today. If people now keep their jewellery in bank lockers, the people of Moenjodaro kept theirs in copper or silver vases, which were after buried carefully under the floors of their homes.

Barter System in the Indus Valley Civilization

Pervin T. Nasir

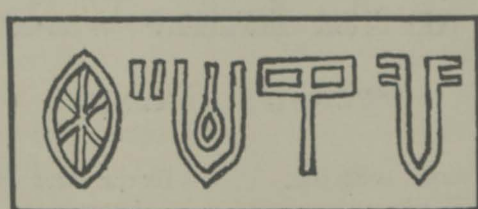
MAN with his great mobility and wide distribution on the earth's surface could not possibly have thrived if he had lived in isolated communities. As his needs grew and the resources available to him did not keep pace with his new needs, a kind of trade started between neighbouring human communities in the form of an exchange of commodities for their mutual benefit. This was a great step forward in the development of human society, as new ideas and fresh knowledge were also exchanged in this process.

In the days of the Indus Valley Civilization, some 5000 years ago, trade was also carried on by barter. The people of the Indus Valley, though masters of a well-developed culture, and living in well-planned cities like Moenjodaro and Harappa, had not yet discovered coinage as a medium of trade. The fertile plains of the River Indus and its tributaries provided them with bumper crops, and they also made numerous articles of personal use with the raw materials available in the Valley. But the discovery of gold objects, precious and semi-

precious stones, copper and bronze utensils and innumerable other articles of this nature, prove it beyond doubt that the inhabitants of the Indus Valley had trade links with lands as far as Mesopotamia and Iran.

The trefoil pattern engraved in relief on the steatite bust of the 'King-Priest' is comparable with the design on the Bull of Heaven from Sumeria. Articles of jewellery made of imported precious and semi-precious stones also appear to be fairly popular. Disc-shaped etched carnelian beads, with white decorations found at Moenjodaro show a similarity of technique with similar beads found in Mesopotamia and Iran. Gold neclaces, fillets for head-wear, armlets, bangles, finger-rings, ear-rings and anklets also include objects made of raw materials brought over elsewhere. Copper and bronze was imported to make domestic utensils, implements, statuettes and ornaments. The utensils consisted of cooking pots, flat dishes, vases and dishes with covers. There is evidence to show that the Indus Valley people, on their part, exported their surplus agricultural produce, and used wheat, barley, sesamum, dates, cotton etc. for barter purposes.

The great granary discovered at Moenjodaro can thus be described as a sort of 'Public Treasury'. The granary is one of the most outstanding structures on the citadel mound. The solid platform of brick-work divided by a grid of corridors of air-ducts present an extremely well-developed system for the storage of grain. Along the northern face of the granary is a loading platform or yard from where sacks of grain could be hauled up to the storage area. The great size of the granary suggests that it must have been a central storing arrangement of the ancient city of Moenjodaro from where grain was disbursed to 'finance' barter trade with lands far and near, as well as to meet local requirements in times of famine.



PART TWO

SECTION I: THE MASTER PLAN

The Control of Ground-water Table at Moenjodaro

Sultan A. Aryne

AND

Masood H. Khan

AMONG those who are interested in the preservation of the cultural heritage of man there is probably no place in the world that has challenged the ingenuity and skill of the scientist, the engineer and the archaeologist more than Moenjodaro, with the possible exception of Abu Simbel. The civilization that Moenjodaro represents is as mysterious and speculative in its origin as it is about its end. While the precise archaeological dating must be left to those qualified to assess it, it is now commonly believed that the Indus Valley Civilization dates back to nearly 5,000 years. As to its end, it has been suggested that a rising water-table and salt incrustation may have destroyed the city.[1] While it is difficult to believe this could be the reason originally, it is certainly the cause of deterioration and decay of the remains we see around us today.

Indubitably it is a great tragedy that within a few decades of their seeing the light of day, the priceless monuments of Meonjodaro, which had remained in a remarkably well preserved state for nearly 50 centuries, should be plagued by the menace of waterlogging and salinization in its worst form. It is still greater tragedy, and a paradox of facts, that these destructive elements are indirectly of man's own making in his search for progress and plenty. Whereas in the case of the Nubian monuments, the threat to their safety was a sudden result of deliberate actions, the danger to Moenjodaro has grown slowly through unintended actions. Nevertheless, it has acted like the cancer or leprosy, which, as we fortunately now know, can be arrested. Therefore, there is no gainsaying the fact that the possibility as well as the importance of saving Moenjodaro is unquestionable.

The dawn of the twentieth century saw the introduction of artificial irrigation in the Subcontinent. By the thirties its benefits had reached Sind in the Lower Indus plains. But within twenty years it had unfortunately brought in its wake a widespread tale of woe in the form of waterlogged and salt infested lands going out of cultivation and affecting human habitation as well. As this menace assumed alarming proportions, the whole nation arose as one man to combat it with everything at its command. Therefore it is understandable that, in their preoccupation with more urgent problems, the Government and the people of Pakistan were not able to give Moenjodaro all the attention it deserved. It is thus not surprising that many of us, particularly those entrusted with their care, had to watch these monuments crumble before our very eyes, sometimes with helplessness, and at other times with impotent rage at our inability to save them.

The Problem

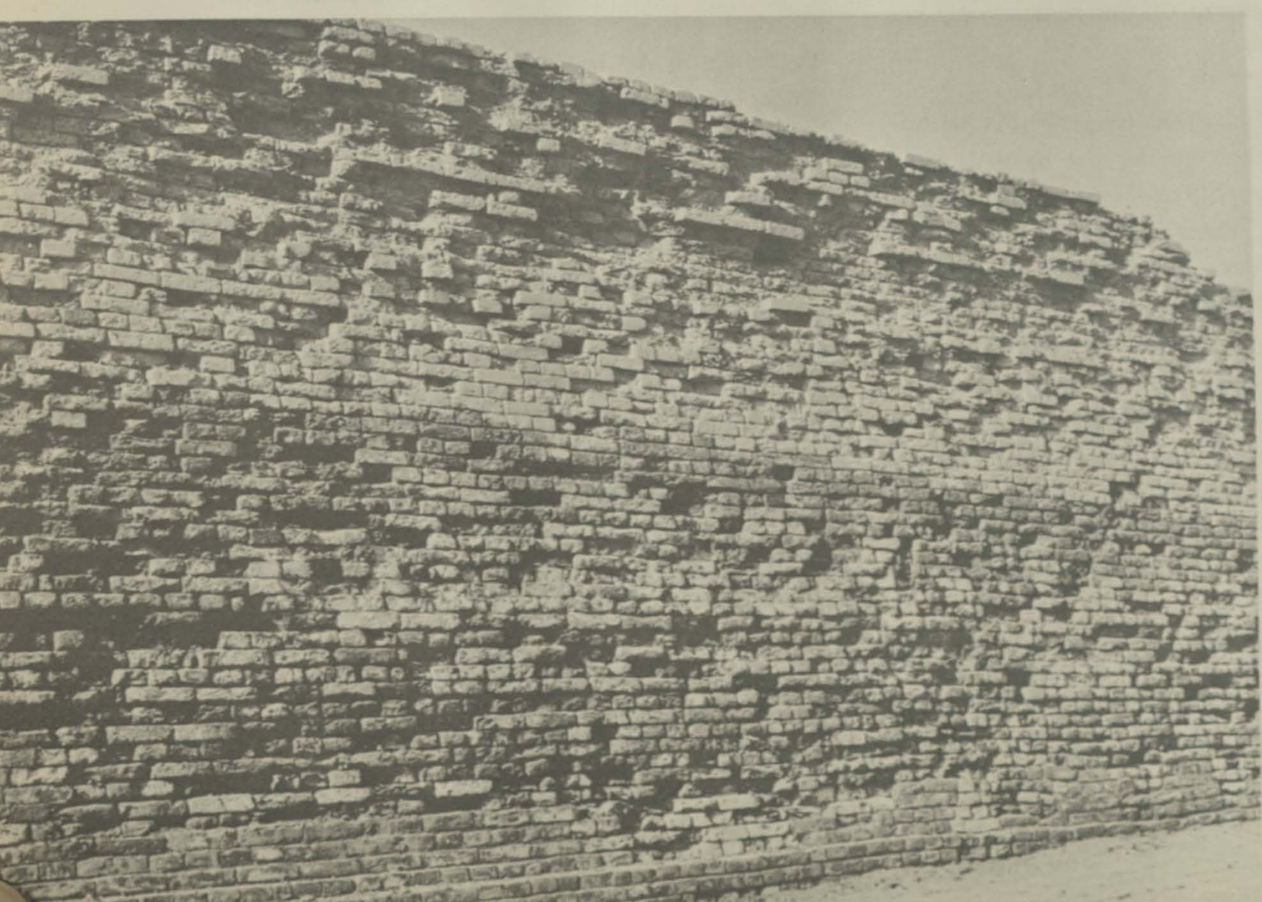
The case of Meonjodaro, perhaps unique in this world in more ways than one, has posed several challenges. Firstly, there is the direct

1 G.F. Dales, *The Mythical Massacre at Moenjodaro*, 1964.



Wall treated with damp-proof course.

Wall attacked by rising ground-water.



threat of erosion by the River Indus, which is very close to the site these days. It is hardly any consolation to see the monuments surrounded on all sides by high embankments of earth which are there only to keep out the river spill at times of high flood. They are of no consequence if the river decides to erode its western bank. Secondly, there are the natural forces of wind, rain and sun which continuously beat upon the remains. To counteract the weathering action of these agents the custodians of Moenjodaro are no doubt continually engaged in devising ways and means of saving and conserving the structures, but they are attempting this Herculian task with resources which are far from sufficient. Their task is monumental indeed. Thirdly, the most perplexing and challenging problem of them all has been that of the decay and deterioration of brickwork by salts inherent in the soil body, which have been pushed up to the surface by a rising ground-water. But before we proceed to examine more closely how this decay occurs, it will not be out of place here to recount briefly the previous attempts made to arrest, if not eliminate, the alarming menace that we are facing today.

Previous History

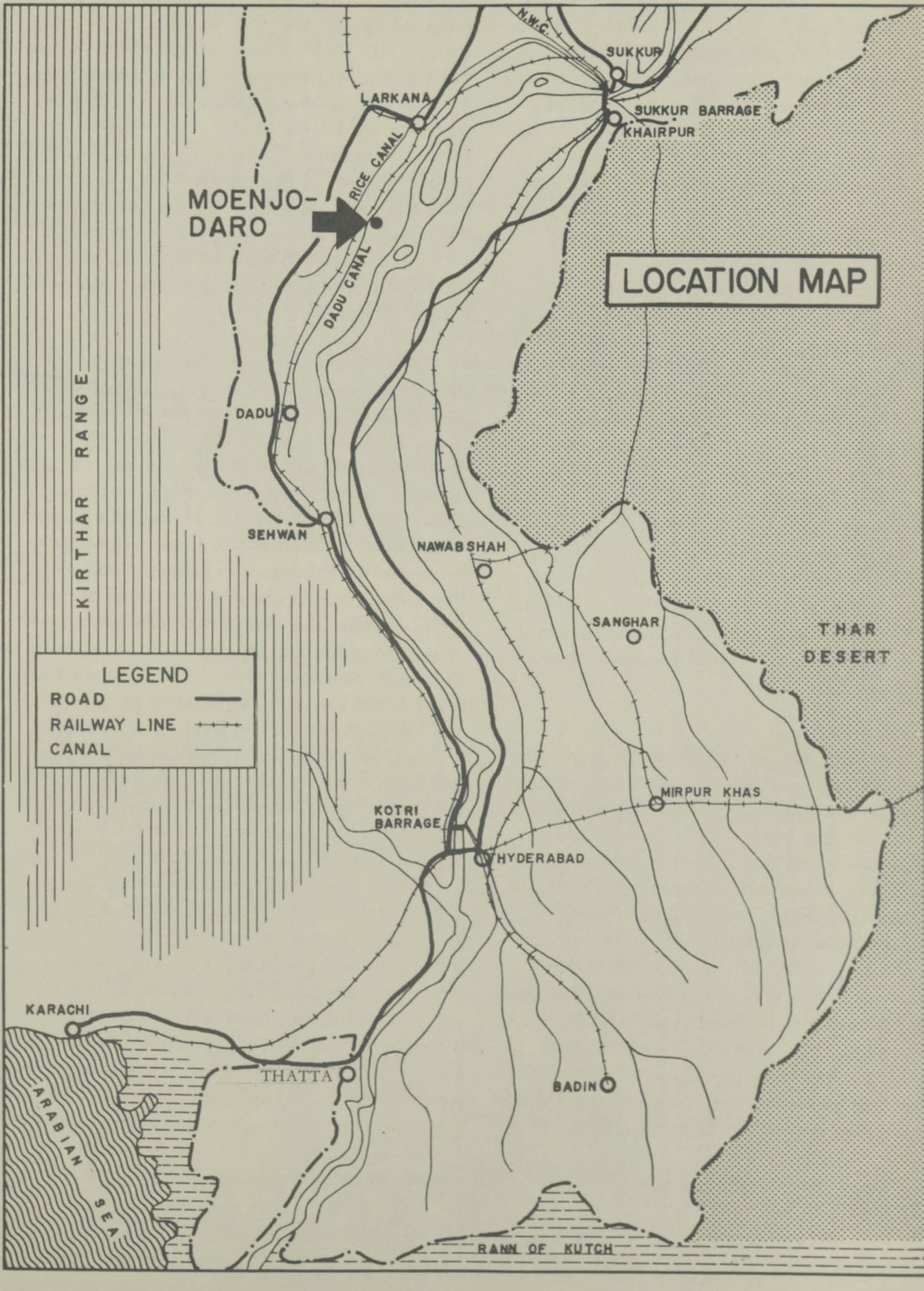
The Government of Pakistan were first seized of the problem in the early sixties. Realising the seriousness and importance of preserving these historical remains, the Ministry of Education and Scientific Research asked the Water and Power Development Authority of Pakistan (WAPDA) in 1962 to initiate preliminary field investigations at Moenjodaro. WAPDA entrusted this work to their consultants, namely Messrs Hunting Technical Services Limited and Sir M. MacDonald and Partners of London, who submitted their findings in August 1962.[2] This report does not contain any subsurface geological and hydrological information. It relies entirely on data of a general nature collected up till that time for the Lower Indus Project. Its most important recommendation was that the programme of sinking tubewells at Moenjodaro, recommended earlier, be held in abeyance until such time as more definite information became available through a detailed programme of hydrogeological investigations. Such a programme would cost the Government nearly 1.4 million rupees. Another important recommendation was the banning of rice cultivation within a radius of one mile from Moenjodaro.

In February, 1963, the Education Ministry decided to approach Unesco for its assistance and advice. The dynamic force behind this move was the then Minister for Industries and Natural Resources, Mr. Zulfikar Ali Bhutto. Consequently, under the terms of a mutual agreement, a team of experts led by Dr. Harold J. Plenderleith, Director, International Centre, Rome, was to come to Pakistan in January 1964. The Plenderleith team's report was received in early 1965.[3] Briefly, this report recommended, as a 'minimum solution', digging a drainage canal around the monuments. In the team's view this drain would lower the water-table permanently to 10 feet below the plain level. As a 'maximum solution' of the problem, the Unesco Mission recommended lowering the water-table by 30 feet by means of tubewells, 150 to 165 feet deep, around the area and banning rice cultivation between the site and the Dadu Canal. The Unesco team also laid great stress on a comprehensive programme of surveys and investigations before either the 'minimum' or the 'maximum' solutions were attempted. They estimated that it would cost 200,000 rupees and 475,000 rupees on investigations alone for the two solutions respectively. Their report was examined by officials of the Pakistan Government at Moenjodaro on 4 March 1965 in all its aspects. The Pakistani experts were understandably not

2 *Moenjodaro, an interim report on investigations of deterioration of brickwork through dampness and salinity*. August, 1962.

3 Unesco Mission of Experts, *Preservation of Monuments at Moenjodaro*, 1964.

Figure 1


LOCATION MAP
MOENJO-DARO
N.W.C.
SUKKUR
SUKKUR BARRAGE
KHAIRPUR
LARKANA
RICE CANAL
DADU CANAL
DADU
KIRTHAR RANGE
SEHWAN
NAWABSHAH
SANGHAR
THAR DESERT
LEGEND
ROAD
RAILWAY LINE
CANAL
KOTRI BARRAGE
HYDERABAD
MIRPUR KHAS
KARACHI
THATTA
BADIN
ARABIAN SEA
RANN OF KUTCH

in favour of digging a drainage trench around the monuments. However, they were unanimous on the tubewell-method of lowering the water-table. Sir Mortimer Wheeler, who was fortunately visiting Moenjodaro on that day, joined these deliberations and pointed out that eventually the 'maximum solution' would have to be adopted, but should not be attempted until the results obtaining after the implementation of the 'minimum solution' were available and had been carefully examined.

Subsequently, Unesco retained the services of the Netherlands Engineering Company (NEDECO) and charged them with the preparation of a detailed plan. The company prepared topographic maps of Moenjodaro and carried out permeability and leaching tests. They also installed a tubewell just outside the periphery of the exposed monuments and tried to carry out a pumping test. On the basis of these field investigations and studies, NEDECO prepared a report entitled *Desalinization of Moenjodaro.*[4] The highlight of their recommendation was the excavation of a deep drain on the periphery of the ruins. In October 1968, another Unesco Mission, under the leadership of Sir Mortimer Wheeler,[5] came to Pakistan and studied the problems of Moenjodaro and the NEDECO report. The Mission recommended 'short-term' measures for the conservation of the remains and 'long-term' measures for lowering the water-table sufficiently below ground level to stop capillary action. The Wheeler Mission did not approve of the construction of a deep drain proposed by NEDECO.

In January 1971, the Education Ministry charged WAPDA, the Archaeology Department and the Irrigation and Power Departments of Sind and Punjab to prepare a master plan for Moenjodaro, with the active participation of Unesco experts at the proper time. Eventually this master plan, which took a little over a year to prepare, was ready by September 1972. This is now before this august assembly.

Scope of Paper

It is not the intention of this paper to go into the entire master plan. Time would not allow it. However, it is proposed here to describe briefly, in terms of engineering considerations, that part of the plan which deals with the control of ground-water at Moenjodaro.

Location of Moenjodaro and its topography

Moenjodaro's archaeological remains are located on the right bank of the Indus River, about 200 miles north of Karachi and only 17 miles south of the town of Larkana (Figure 1). They are ringed all round by earthen embankments about 10 feet high, the eastern levee being only half a mile from the edge of the river. To the west of the monuments, about 2 miles away, flows the Dadu Canal, a perennial irrigation channel taking off from Sukkur Barrage and flowing in a north-south direction (Figure 2). The monuments are situated in a part of the Indus Valley where the ground levels vary between 151 and 154 feet above mean sea level. Maximum flood levels in the river, opposite Moenjodaro, have reached the 165-foot mark, whereas the Dadu Canal generally flows with its water level at 158 feet. This level is often exceeded during summer months when there is a heavy demand for irrigation water.

The elevations of the mounds containing the remains, however, vary considerably, the lowest excavation levels being near the surface of the ground and the stupa mound about 45 feet above it.

Climate and Soils

The climate of the Lower Indus Plains is arid, the average rainfall around Moenjodaro

4 Messrs Netherlands Engineering Company, *Desalinization of Monuments of Moenjodaro,* 1966.

5 Unesco Mission to Moenjodaro, Pakistan, 1965-69.

being less than 5 inches annually. Most of it occurs during the monsoon months of July and August. The maximum summer temperature goes up to 115°F and the minimum winter temperature can fall to 40°F. Because of high temperatures and strong winds, rates of evaporation are high. The average relative humidity varies from 54 per cent to 77 per cent. The scanty rainfall has practically no effect on the soils of Moenjodaro.

The top soil of the area is predominantly loam and sandy loam. The subsoil consists of 90 per cent of water yielding unconfined aquifer, the top 50 feet of the soil profile being relatively heavier soil.

The Ground-water Table

The water-table in 1922 was reported to be about 25 feet below normal ground level. The present depths to the water-table fluctuate between 5 feet in October and 12 feet in May every year (Figure 3). A study of the water-table contours of upper Sind indicates a general movement of the ground-water body in a south-easterly direction. There is no doubt that the introduction of perennial irrigation from the Sukkur Barrage has resulted in the gradual rise of the water-table. Widespread cultivation of rice around Moenjodaro has aggravated the situation, particularly because the pancho system of watering rice is practiced here. Furthermore the area lies between two recharge sources, namely the River Indus on the east and the Dadu Canal on the west. The Indus feeds the ground-water reservoir during periods of high flood, whereas the Dadu Canal, in combination with the lands irrigated by it, contributes considerably to the rise in ground-water levels.

The movement of water from a water-table to the point where it evaporates is by means of capillary transfer. Interconnected soil pores act as an assembly of tortuous capillary tubes. The height to which water rises by capillary transfer increases with the fineness of the tubes, but the rate at which transfer takes place decreases sharply with increasing fineness. [6] This explains the unusual heights of dampness to which the brick walls at Moenjodaro are subjected, because the pores in brickwork are much finer and wall foundations lie perpetually in saturated ground. The problem therefore is of controlling the water-table to a depth which will not allow ground-water to rise to the surface by capillary attraction, because in so doing the native ground-water brings with it hygroscopic salts in solution from the soil. It saturates the structures, sometimes up to 30 feet from the normal ground level. The moisture rapidly evaporates due to high temperatures and aridity, leaving the salts to crystallize in the pores near the exposed surface of brickwork. In the process, heavy pressures are exerted on the sides of the pores which break up the surface of the bricks. A continuous cycle of saturation, evaporation and crystallization is created, causing the brick masonry to exfoliate and crumble into dust.

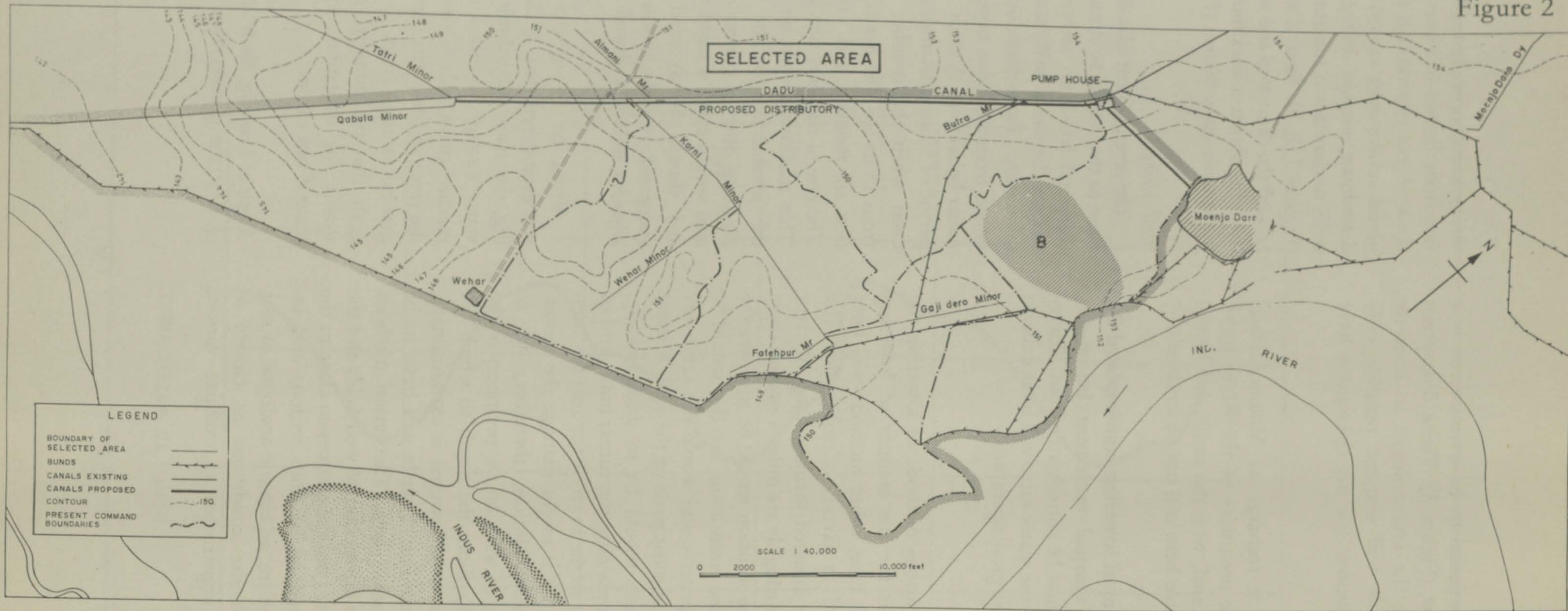
Requirements of Moenjodaro

Obviously the solution lies in lowering the water-table. This must be done at least to the extent that the upper limit of the capillary fringe is kept well below the lowest foundation levels of the exposed monuments.

Boreholes drilled by NEDECO in 1966 confirm earlier assumptions that habitation remains lie buried very deep (Figure 4). Brickwork and pottery were encountered by NEDECO at 60-70 feet below the normal ground level. While drilling for a test well in January this year near the main entrance to the site, a brick wall was encountered at about 4 feet from the ground. The well point was shifted, but broken brick

6 *Lower Indus Project Report,* Part One p. 34, Messrs Hunting Technical Services Limited and Sir M. MacDonald and Partners, 1966.

Figure 2


SELECTED AREA
DADU CANAL
PROPOSED DISTRIBUTORY
PUMP HOUSE
Tatri Minor
Qabula Minor
Almani Mr
Karni Minor
Wehar Minor
Wehar
Butra Mr
Gaji dero Minor
Fatehpur Mr
Moenjo Daro
Moenjo Daro Dy
B
N
INDUS RIVER
LEGEND
BOUNDARY OF SELECTED AREA
BUNDS
CANALS EXISTING
CANALS PROPOSED
CONTOUR
PRESENT COMMAND BOUNDARIES
SCALE 1 40,000
0
2000
10,000 feet

and pottery continued to be encountered to a depth of 37 feet (Figure 5). These discoveries naturally tempt the archaeologist to excavate deeper; but this will become possible only when dry conditions for his operations have been provided.

Ground-water recharge at Moenjodaro is high due to the proximity of the River Indus and the Dadu Canal, with the result that lowering the water-table here will not be so simple.

For the extent of lowering contemplated the probability of unequal settlement below the monuments cannot be entirely ruled out. Therefore, depressing the water-table will be as delicate a process as a surgical operation.

The Plan

There are various methods of lowering the water-table; but for the amount of lowering required in this case, other methods will have to be discarded in favour of tubewells. The monuments are situated inside a loop of river bunds, which is roughly six miles long and three miles wide. One solution would be to lower the water-table in the entire loop, but this would be enormously expensive and would not serve any useful purpose in most parts of the area. A more realistic approach would be to drain, locally, specific areas containing the ruins; but a grid of wells extending to the heart of the area has been ruled out because it might damage the monuments. The best solution, therefore, lies in installing a ring of wells on the periphery of the ruins (Figure 6). Since the depth to which the water-table has to be lowered is extraordinary, a very large number of wells will have to be installed in a small area. Theoretical methods of studying the interaction of well fields and the behaviour of the two-line sources so close to the area were found to be both tedious and inaccurate. Therefore, an electric analogue model, simulating the site conditions as closely as possible, was constructed to examine various arrangements of wells and to study the contribution from the two-line sources of recharge. From the analogue experiments that were carried out, useful results with regard to well-siting, time-drawdown, seepage-drawdown, and number of wells to drawdown relationships, were obtained (Figures 7, 8, 9). Several arrangements of wells around the excavated and unexcavated sites were tried to obtain a maximum depression of the water-table up to 80 feet (Figures 10, 11).

Well Siting

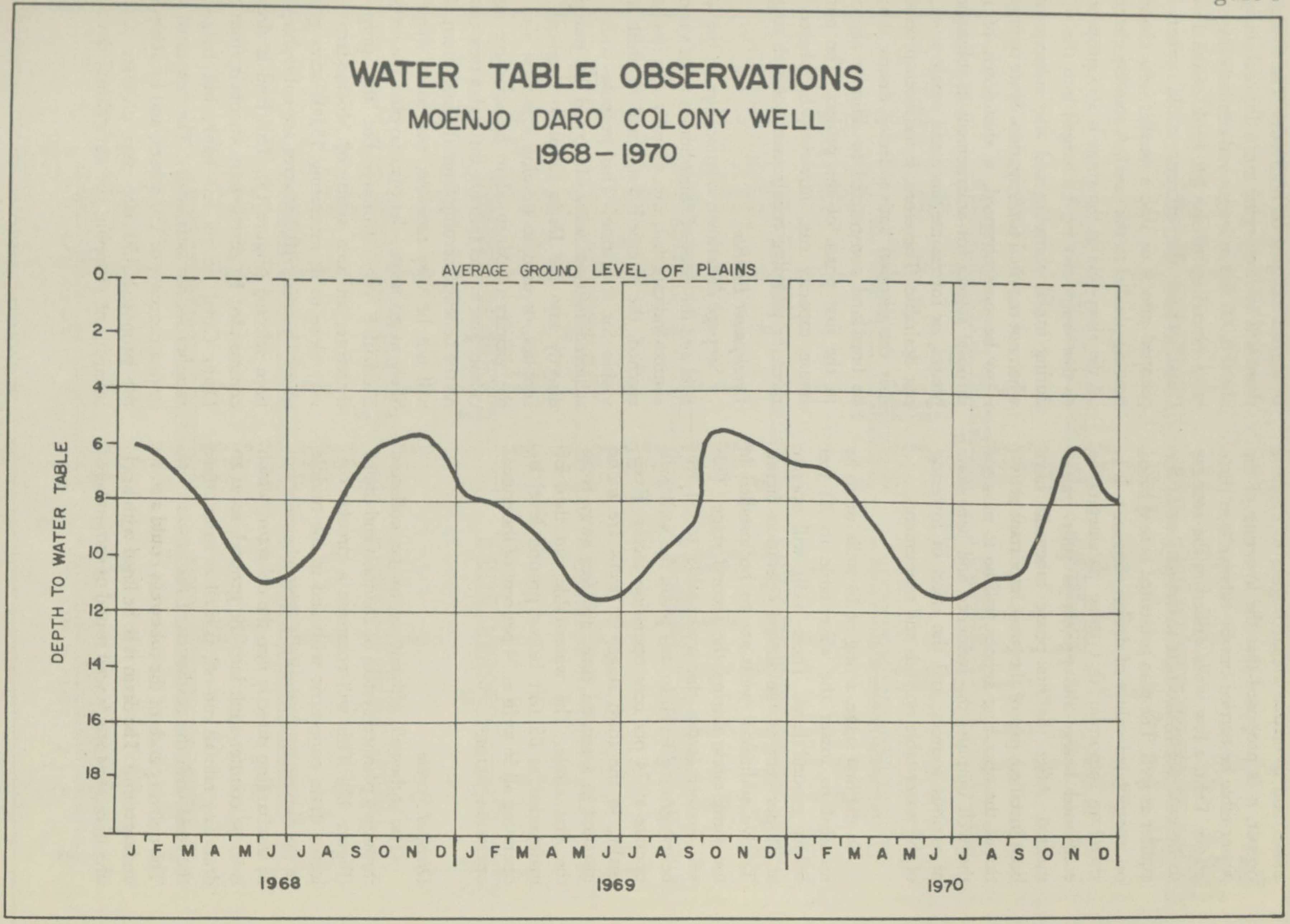
The arrangement of a dense location of wells close to the area to be drained was found preferable, and has been recommended. A 500-foot spacing between wells was considered to be a minimum. Time-drawdown relationships obtained from analogue experiments showed a peculiar behaviour. A stady state was reached in a period of 15 months in all analogue experiments, even when the number of wells was varied from 13 to 56. The drawdown was rapid in the first six months, and very gradual thereafter. The rate of recovery was also of the same order. This relationship had an important bearing on the formulation of the operational schedule. Shutting down a cluster of wells in a localized area would cause a rapid rise in the water-table, and should be avoided. Closure should be staggered over the whole area, so that no two adjacent wells are closed at the same time.

From the seepage-drawdown relationship it was established that, at the beginning of pumping, the major contribution came from ground-water storage; whereas after a steady state is reached two-thirds of the pumping comes from the river and one-third from the canal, while the ground storage stops to contribute. This suggests that the pumped water will certainly be usable for irrigation on reaching the steady state if not earlier.

Stages of Lowering the Water-table

For the preservation of the exposed monu-

Figure 3



WATER TABLE OBSERVATIONS
MOENJO DARO COLONY WELL
1968 – 1970
AVERAGE GROUND LEVEL OF PLAINS
DEPTH TO WATER TABLE
0
2
4
6
8
10
12
14
16
18
J F M A M J J A S O N D
J F M A M J J A S O N D
J F M A M J J A S O N D
1968
1969
1970

ments and to enable archaeologists to excavate deeper, it is proposed that the lowering of the water-table be carried out by tubewells in three stages. First, a few wells drilled in the area are to be used for hydrologic investigations of the aquifer as well. The plan presented here is based on interpolated values of design constants. It is therefore important that these parameters be confirmed before the project is fully implemented. After the first-phase tubewells have been installed, one of the most important activities of the operating agency will be to monitor the well outputs, the influence and behaviour of various sources, and the effect of lowering of the water-table on soils and monuments.

In the first stage, a ring of 14 wells are to be installed to lower the water-table to 20 feet below ground level. These wells will operate at 71 per cent of the annual operation factor. Twelve additional wells are to be installed in the same circle during the second stage. This will further lower the water-table to 32 feet below ground level. In this phase the wells will operate at 74 per cent operation factor. Eventually, in the third stage, 30 wells are to be installed in a second ring, 800 feet away from the first circle. The water-table can then be maintained at 65 feet below ground level by operating all 56 wells at 74 per cent of the annual operation factor.

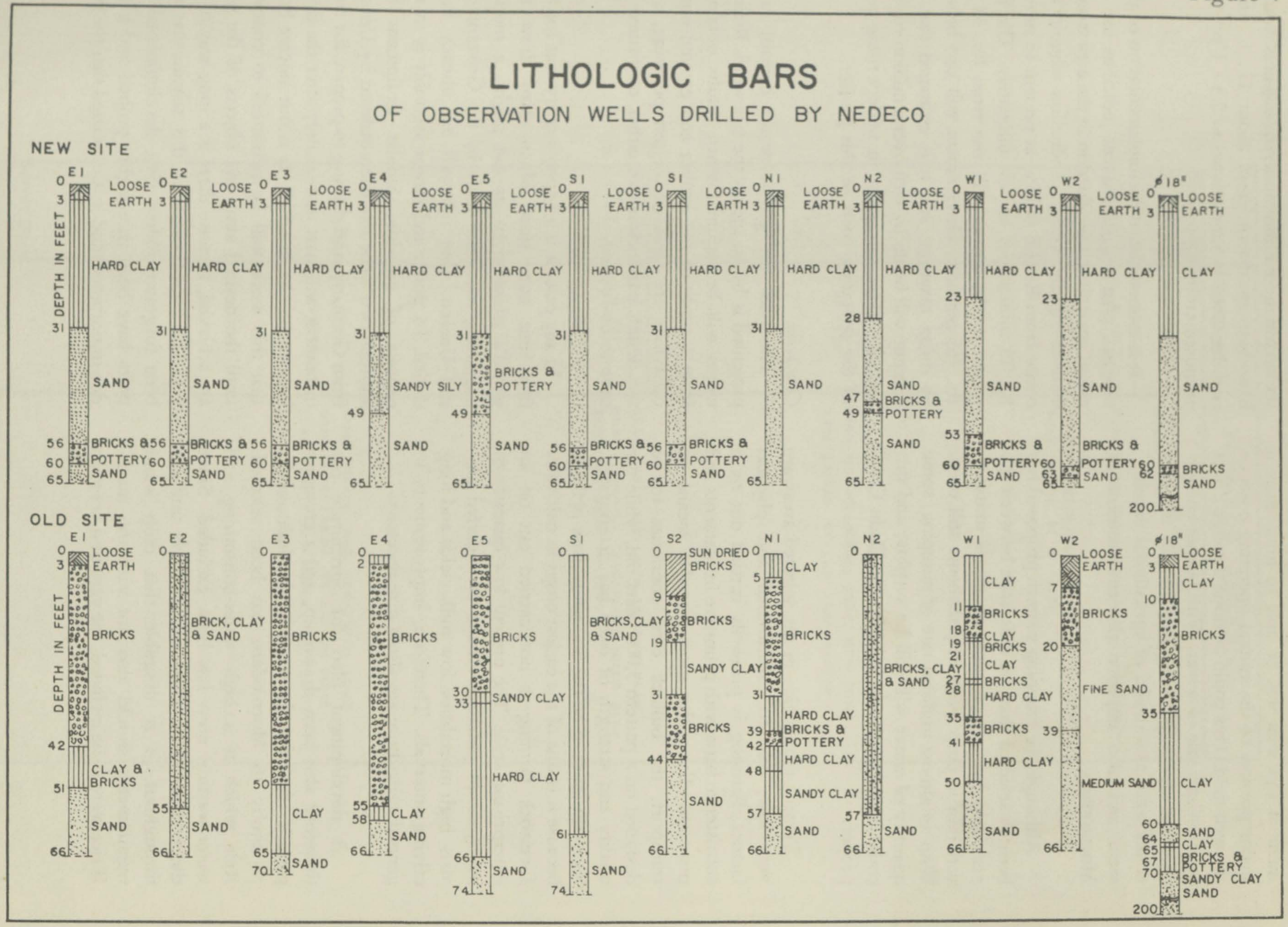
Disposal System

The tubewell effluent is to be collected through a planned system of channels and drains (Figure 12). This will comprise a circular collector drain concentric with and in the middle of the two rings of tubewells. The tubewells will be discharging directly into the collector, which is to be counter-sunk into the ground, so as to drain any rainfall run-off, as well as to interfere the least with the aesthetics of the ancient site. The delivery ends of the tubewells could also be underground. The drain is to be lined with brick tiles in cement and fenced round or camouflaged by a green hedging on both sides. The collector drain will be discharging into a disposal channel about 8,000 feet in length and similarly lined. It is to extend up to the left bank of the Dadu Canal, where the effluent could either be pumped into it or into a smaller new channel flowing parallel to the canal. A standby channel on the river-side of the rings is also proposed, so that water can be discharged into the river during initial pumping and also subsequently when not required for irrigation. Since pumping is to be uninterrupted, a shut-down of the disposal system for enlargement in subsequent phases, or for maintenance and repair work, is not desirable. Therefore, it has been proposed that the disposal and collector drains should be lined and constructed to ultimate capacity in the first phase of the project. The pump house capacity can, however, be phased to meet the pumping requirements of each stage.

Development Benefits

Seepage-drawdown relationships in the well field and the rates of contribution from various sources indicate that, after a steady state has been reached, the pumped water will be fresh and usable for irrigation. This purpose could be achieved in two ways. It could be pumped directly into the Dadu Canal to augment its supplies, or used to develop a modest area in the vicinity of Moenjodaro by intensive agriculture and model farming through a new canal. As the benefits accruing from the first alternative will not be very tangible, and some water is likely to go waste, the plan favours the second alternative very strongly. For this purpose, therefore, an area south of Moenjodaro and very close to it, measuring 15,000 acres gross, of which nearly 10,000 acres are cultivable, has been selected (Figure 13). This land is already commanded by distributary channels from the Dadu Canal on its left bank, but irrigation supplies are not satisfactory. The new canal will have a capacity, of 150 cusecs, and by achieving the proposed 150 per cent ultimate annual intensity of cropping the agricultural develop-

Figure 4


LITHOLOGIC BARS
OF OBSERVATION WELLS DRILLED BY NEDECO
NEW SITE
E1
E2
E3
E4
E5
S1
S1
N1
N2
W1
W2
ϕ18"
DEPTH IN FEET
LOOSE EARTH
HARD CLAY
CLAY
SAND
SANDY SILY
BRICKS & POTTERY
BRICKS
OLD SITE
E1
E2
E3
E4
E5
S1
S2
N1
N2
W1
W2
ϕ18"
DEPTH IN FEET
LOOSE EARTH
BRICKS
CLAY & BRICKS
SAND
BRICK, CLAY & SAND
CLAY
SANDY CLAY
HARD CLAY
BRICKS, CLAY & SAND
SUN DRIED BRICKS
BRICKS & POTTERY
FINE SAND
MEDIUM SAND

ment of this area will be able to underwrite a major portion of the annual operating costs of the well-field. This could be done through direct taxation and sale of water. With proper encouragement and help from Government, the area could serve as a model of agricultural development and also improve the environment of Moenjodaro.

Although the cropping pattern proposed has been so selected that the difference between the peak and low water requirements is minimal, variation in crop water requirements still exist. With an almost uniform rate of pumping, some quantity of water will still be surplus; and this could be conveniently fed into the Dadu Canal proper.

Present crop-yields in the selected areas are very low, due to institutional and physical factors. Farming is primarily carried out on a subsistence basis with primitive implements and practices. Even the most popular means of transport, the bullock cart, continues to be designed on a pattern 5,000 years old, while the quality and strength of oxen has deteriorated. Rice continues to be the favourite crop, perhaps because it is one of the easiest crops to cultivate. Livestock farming is not carried out on an enterprising scale. The present low quantity of management practices results in underfed animals, high mortalities, low milk-yields and long calving intervals. Therefore, improvements in general agriculture are also a dire necessity.

A development plan for agriculture has therefore also been drawn up, and a cropping pattern ideal for the area in the light of its proximity to Moenjodaro has been selected. Rice which is a high water-consuming and water-wasting crop has been excluded. Since the availability of water will be fairly uniform throughout, it is desirable that crop water requirements should also not vary too much. If rice were to be included, the variation between the maximum and minimum requirements would have been of the order of about 11 : 1. This ratio has been brought down to 2.5 : 1 by the proposed cropping pattern.

It is estimated that on implementation of the tubewell plan and subsequent judicious use of water, agricultural production in the area would increase rapidly. Gross production whould increase from Rs. 1.8 million at present to nearly Rs. 15 million per annum ultimately. The net return to the farmer will rise from Rs. 58 to Rs. 765 per acre. Government will also benefit by direct taxation; and it is estimated that its revenue will be up by well over a million rupees annually. This can assist in underwriting part of the operating costs of this project.

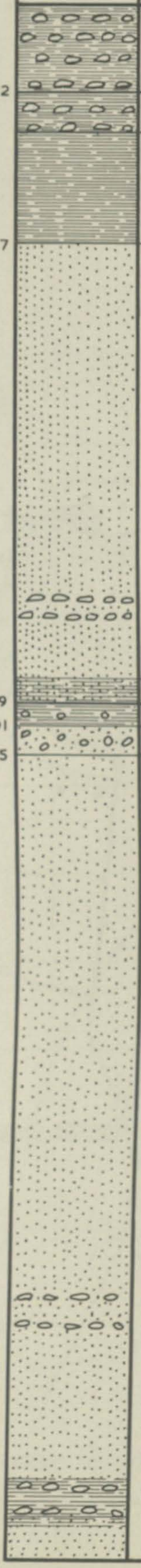
Conclusion

The plan for ground-water control here presented is by no means the last word. Refinements will be required when results obtained from a study of the aquifer and ground-water behaviour are finalized on test pumping, and the design parameters are either confirmed or have to be revised.

In any case, it is a happy augury that for the first time ever since Moenjodaro drew the world's attention to its sad plight, a modest beginning has been made by the Government and Unesco. One tubewell has already been drilled. Its pump and motor assembly is in the process of erection. Similar equipment for another two wells has been ordered by Unesco from Germany, and drilling to prepare for their instalment will start immediately after the development of the test well. It is our sincere hope that this work will be permitted to continue until the desired aims and objects of the plan are achieved, because there is a long way to go yet. The human angle in this scheme has not been forgotten either. The developmental aspects have been thoroughly probed and given due importance; and it is estimated that the plan

Figure 5

DRILLING LOG — MOENJO DARO WELL No. 1
(JANUARY 1973)



Depth (feet)	GRAPHIC LOG	FORMATION THICKNESS	FORMATION DESCRIPTION
12		12 FEET	PIECES OF POTTERY AND BRICK MIXED WITH SOME CLAY
		6 FEET	CLAY, HARD, GREY WITH BRICK AND POTTERY
37		19 FEET	PREDOMINANTLY CLAY, HARD, GREY WITH SOME PIECES OF POTTERY
99		62 FEET	SAND, FINE TO MEDIUM, GREY WITH SOME THIN LAYERS OF CLAY AND KANKAR
101		2 FEET	CLAY, HARD, GREY WITH SOME KANKAR
105		4 FEET	GRAVEL, MOSTLY CALCAPEOUS MIXED WITH SAND AND CLAY PELLETS
215		110 FEET	SAND, MEDIUM, FINE, GREY, WITH SOME GRAVELS BETWEEN 175 AND 180 SOME CLAY WITH FINE KANKAR BETWEEN 200 AND 210 FEET

Figure 6

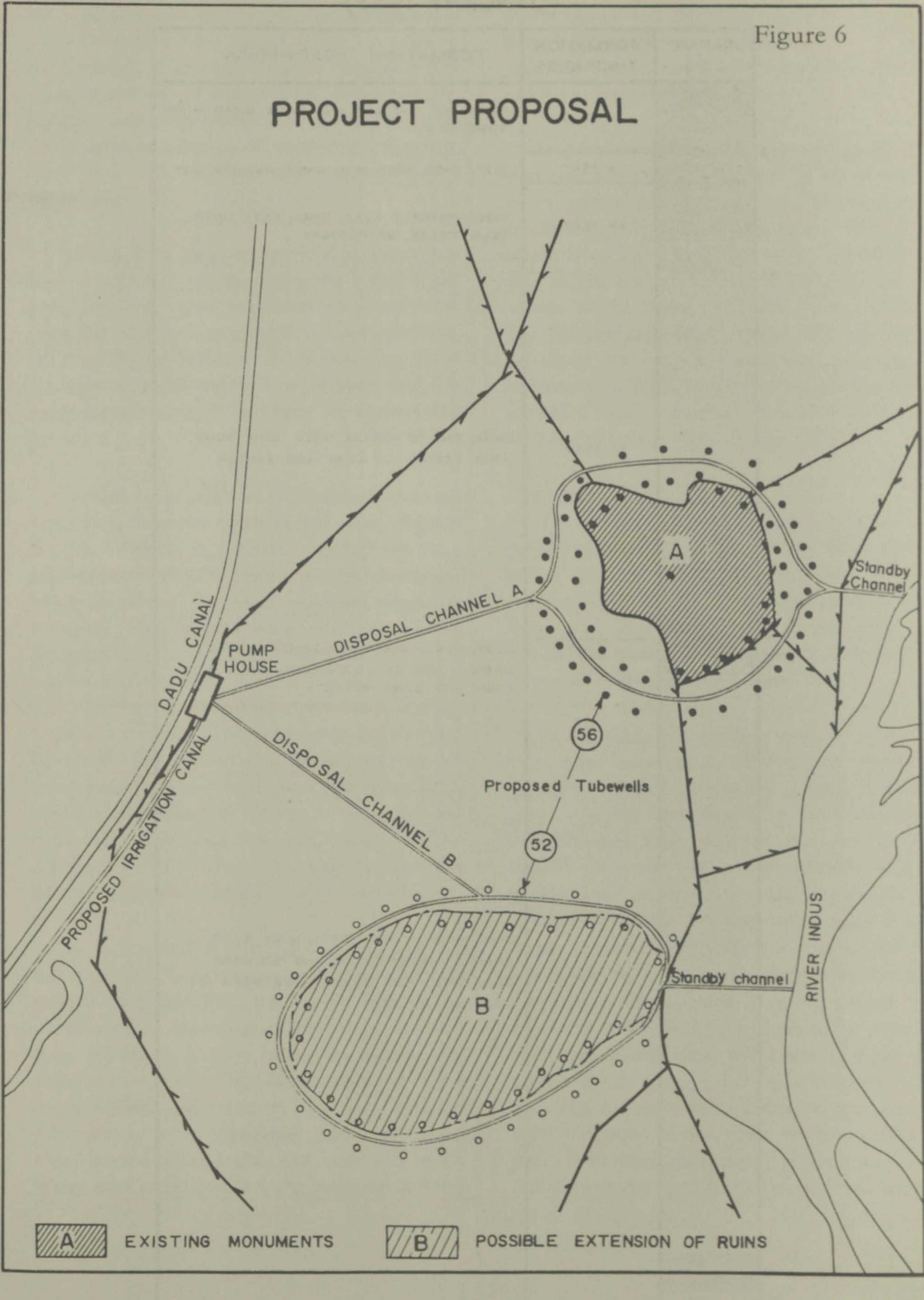

PROJECT PROPOSAL
DADU CANAL
PUMP HOUSE
DISPOSAL CHANNEL A
DISPOSAL CHANNEL B
PROPOSED IRRIGATION CANAL
A
B
56
52
Proposed Tubewells
Standby Channel
Standby channel
RIVER INDUS
A EXISTING MONUMENTS
B POSSIBLE EXTENSION OF RUINS

Figure 7

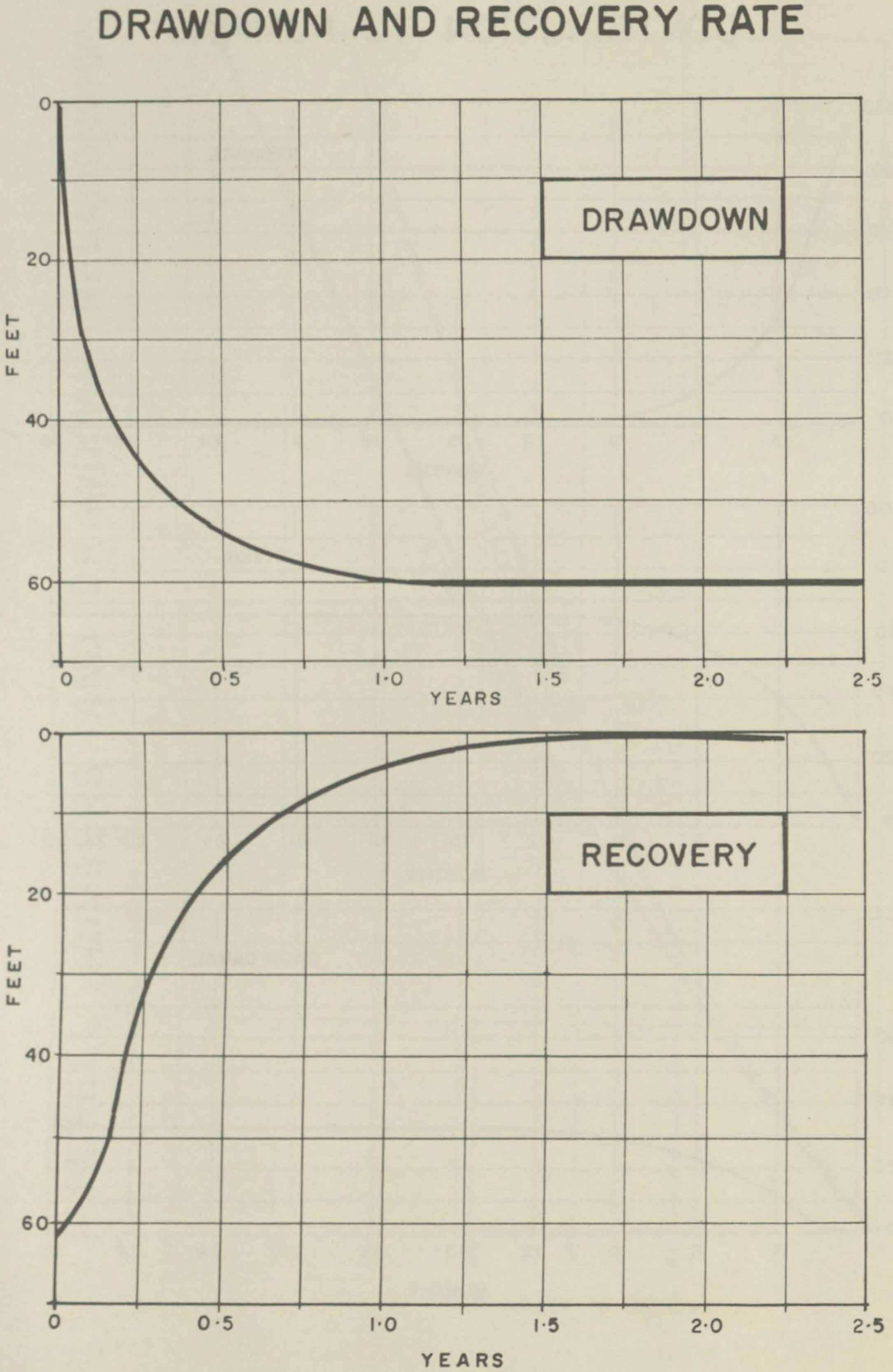

DRAWDOWN AND RECOVERY RATE
DRAWDOWN
FEET
0
20
40
60
0
0·5
1·0
1·5
2·0
2·5
YEARS
RECOVERY
FEET
0
20
40
60
0
0·5
1·0
1·5
2·0
2·5
YEARS

Figure 8

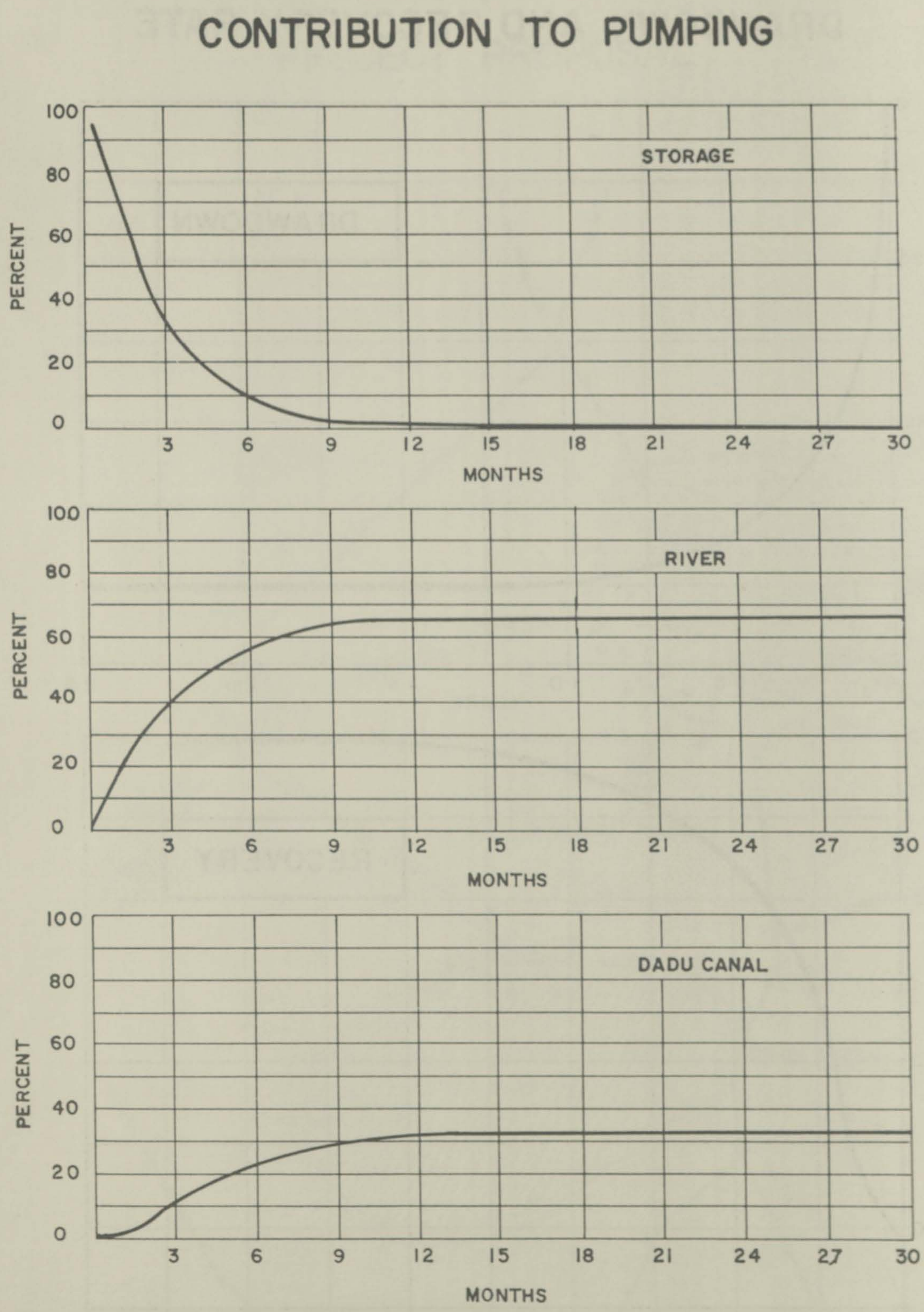

CONTRIBUTION TO PUMPING
STORAGE
PERCENT
100
80
60
40
20
0
3
6
9
12
15
18
21
24
27
30
MONTHS
RIVER
PERCENT
100
80
60
40
20
0
3
6
9
12
15
18
21
24
27
30
MONTHS
DADU CANAL
PERCENT
100
80
60
40
20
0
3
6
9
12
15
18
21
24
27
30
MONTHS

Figure 9

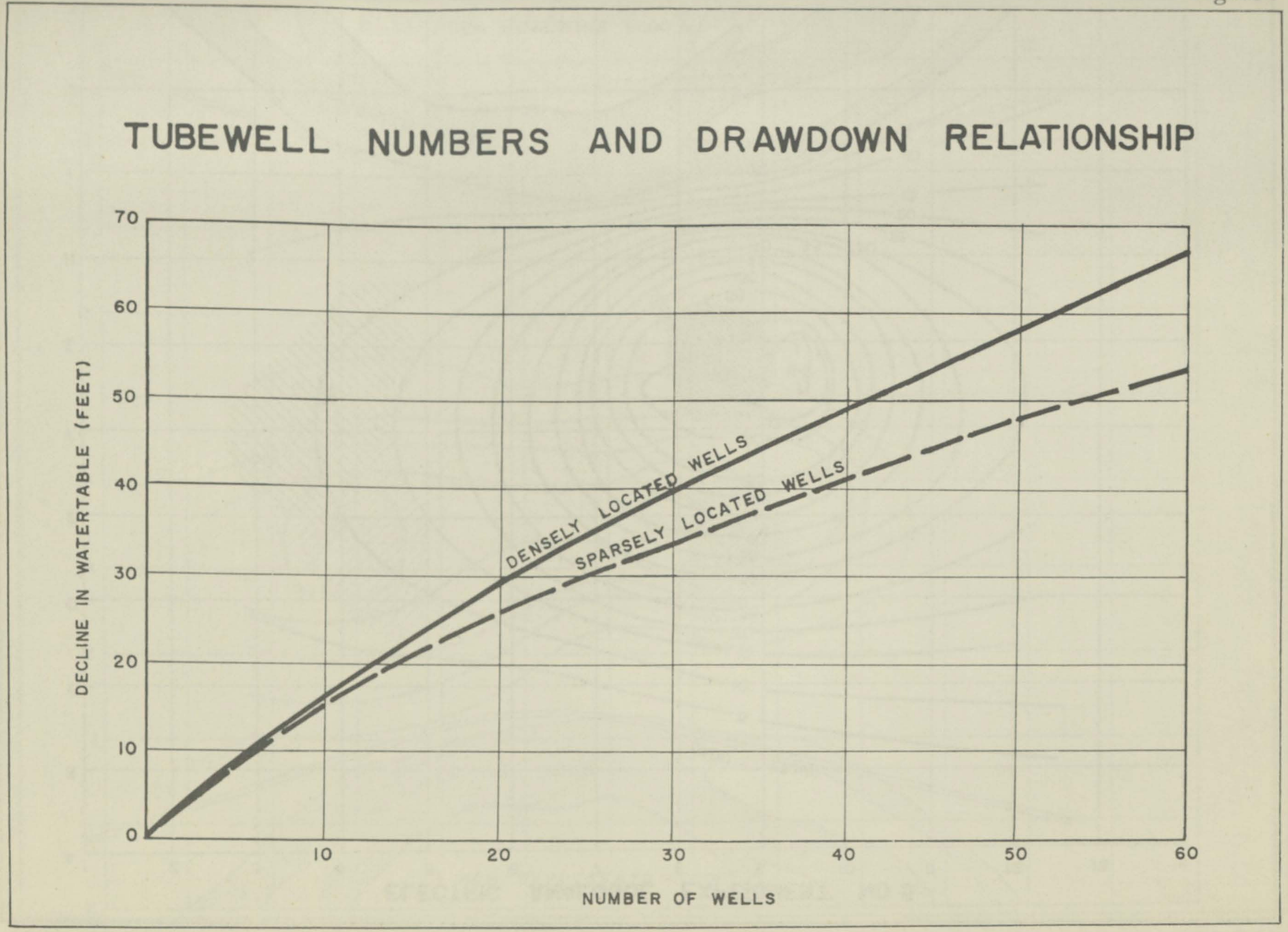
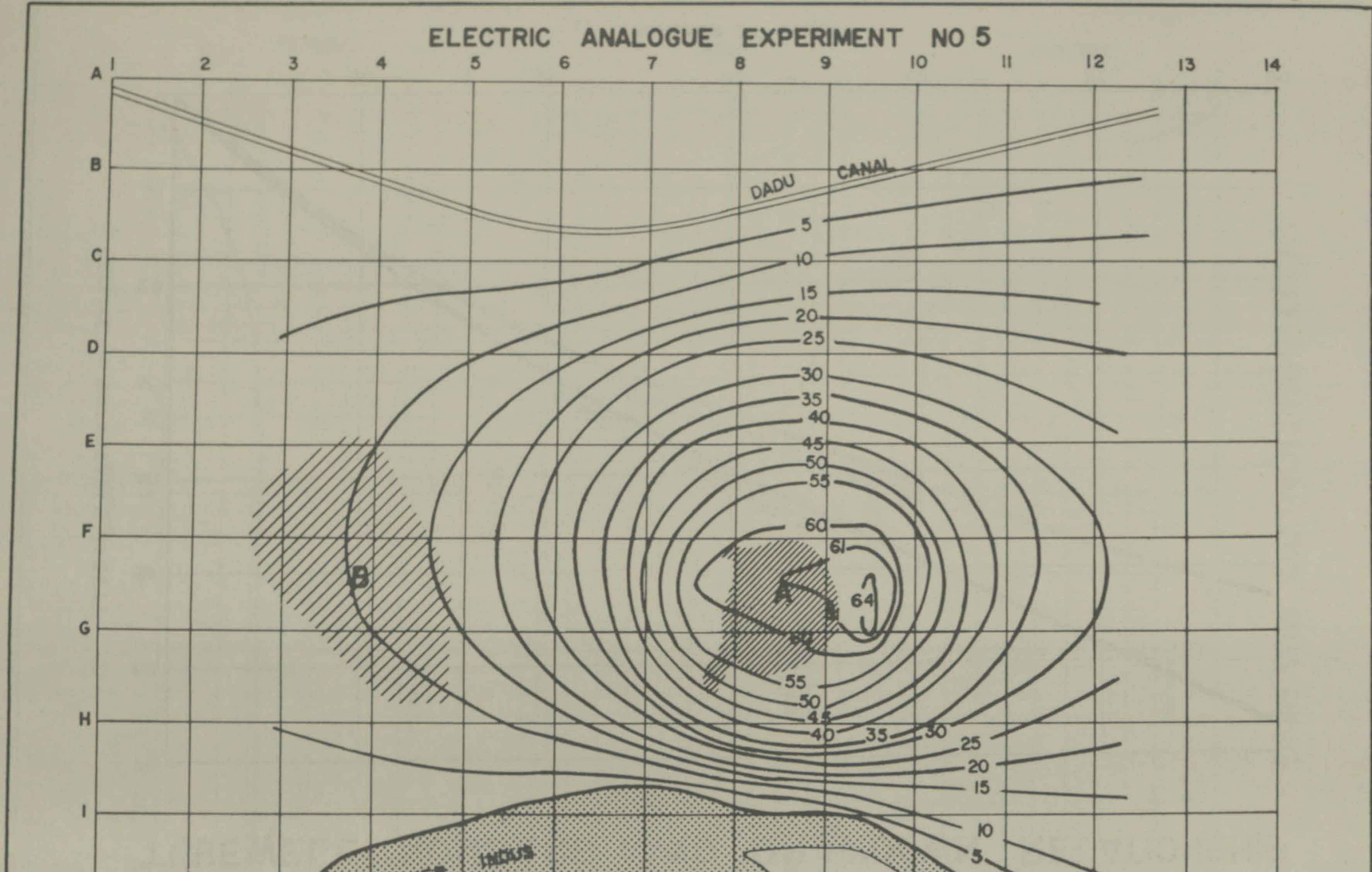

TUBEWELL NUMBERS AND DRAWDOWN RELATIONSHIP
DECLINE IN WATERTABLE (FEET)
70
60
50
40
30
20
10
0
10
20
30
40
50
60
NUMBER OF WELLS
DENSELY LOCATED WELLS
SPARSELY LOCATED WELLS

Figure 10


ELECTRIC ANALOGUE EXPERIMENT NO 5
DADU CANAL
RIVER INDUS
A
B
1 INCH REPRESENTS 4000 FT.

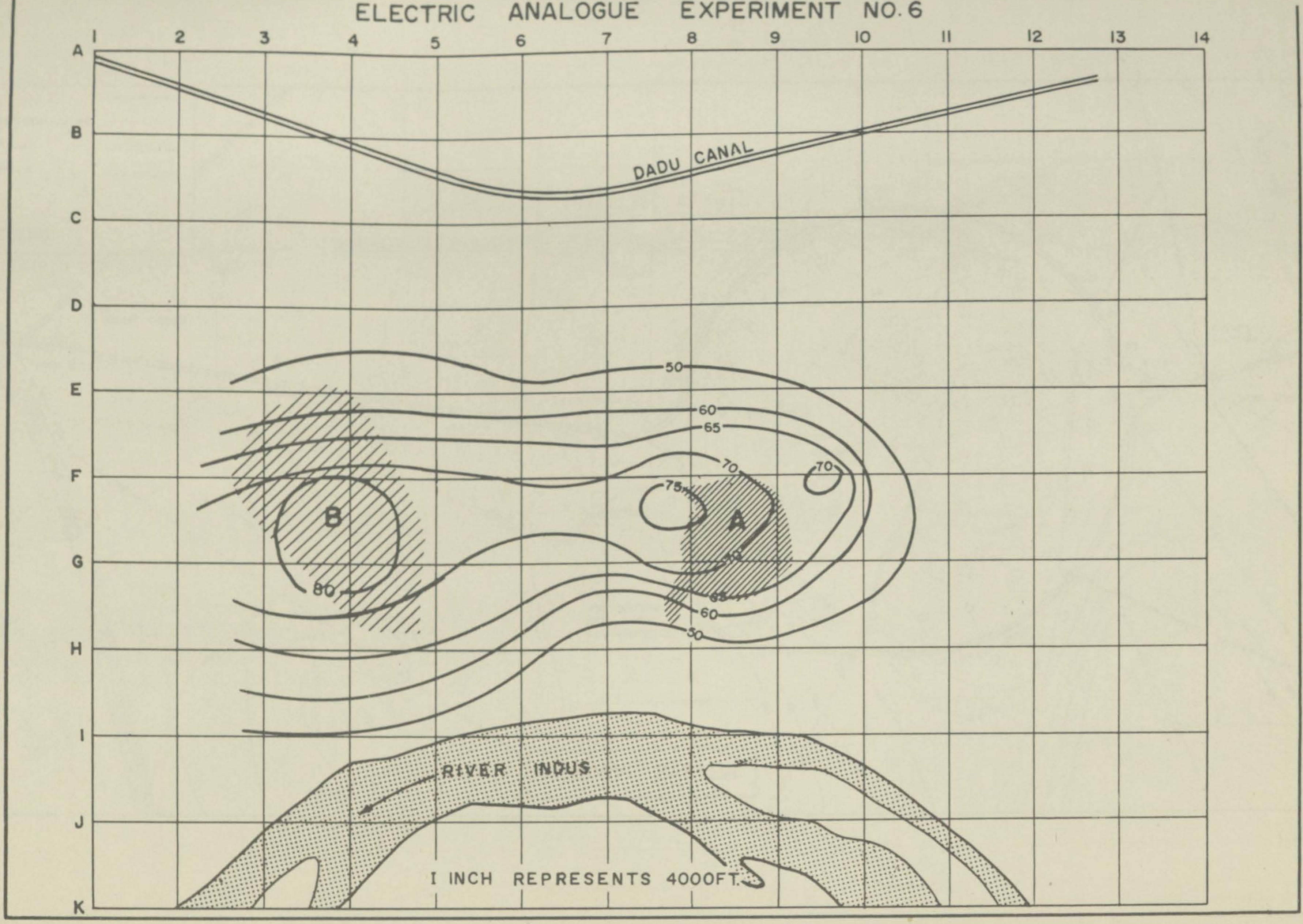

ELECTRIC ANALOGUE EXPERIMENT NO. 6
1 2 3 4 5 6 7 8 9 10 11 12 13 14
A B C D E F G H I J K
DADU CANAL
50
60
65
70
70
75
80
B
A
70
65
60
50
RIVER INDUS
I INCH REPRESENTS 4000FT.

Figure 12

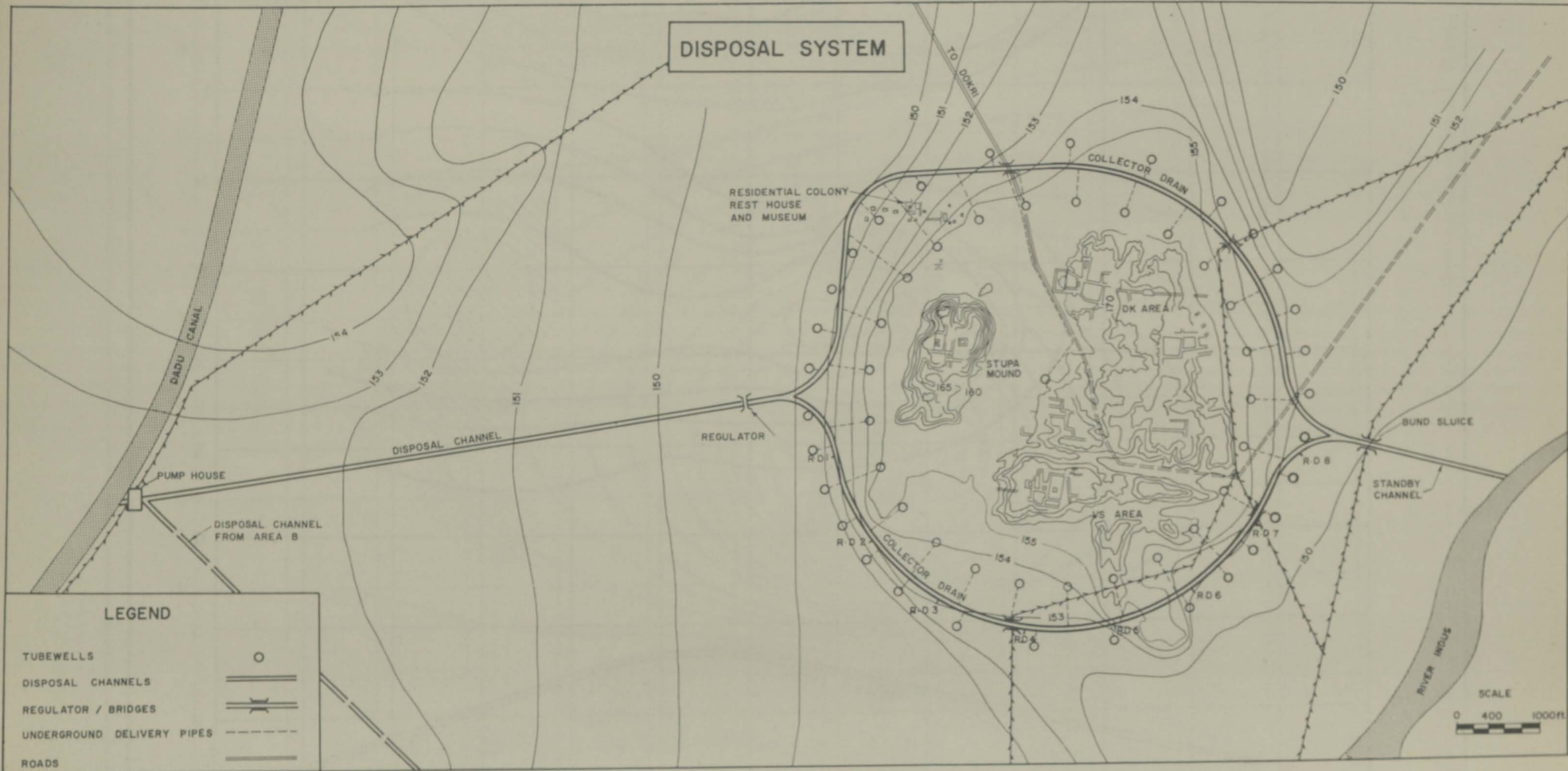
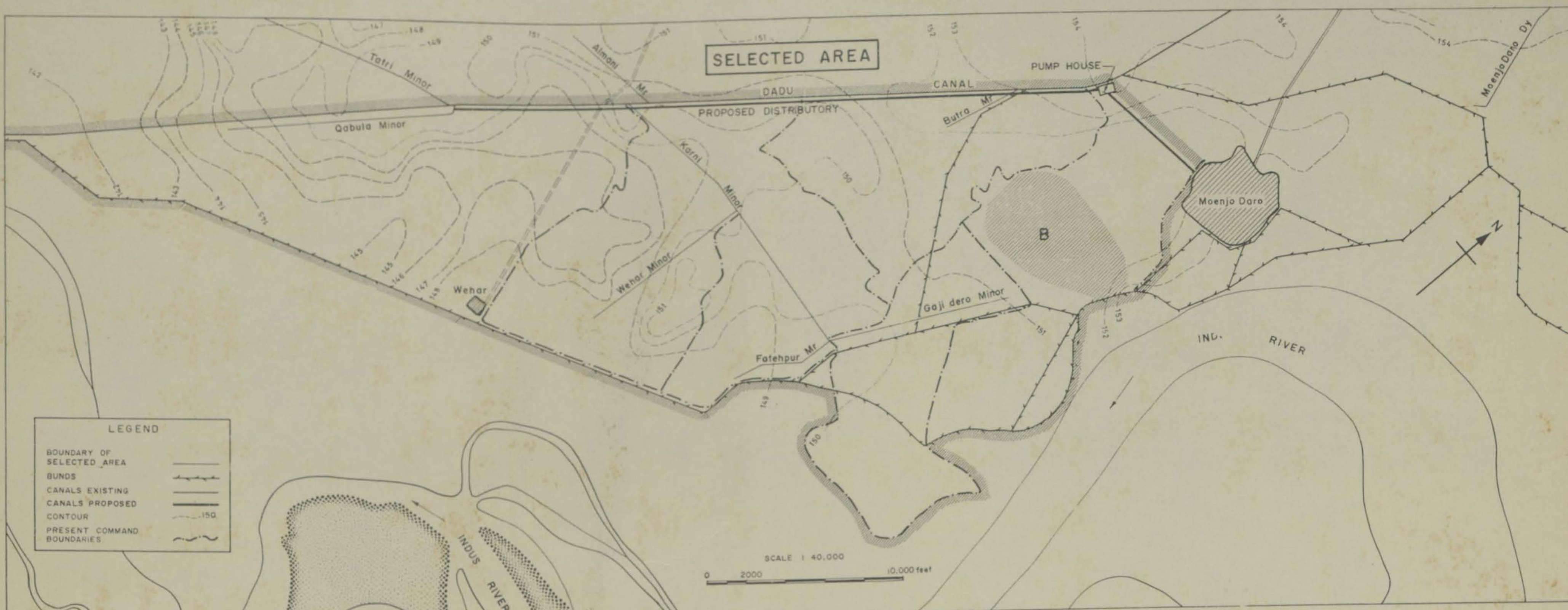

DISPOSAL SYSTEM
TO DOKRI
RESIDENTIAL COLONY
REST HOUSE
AND MUSEUM
COLLECTOR DRAIN
STUPA
MOUND
DK AREA
VS AREA
DADU CANAL
PUMP HOUSE
DISPOSAL CHANNEL
REGULATOR
DISPOSAL CHANNEL
FROM AREA B
BUND SLUICE
STANDBY
CHANNEL
RIVER INDUS
RD 1
RD 2
RD 3
RD 4
RD 5
RD 6
RD 7
RD 8
SCALE
0 400 1000ft
LEGEND
TUBEWELLS
DISPOSAL CHANNELS
REGULATOR / BRIDGES
UNDERGROUND DELIVERY PIPES
ROADS

Figure 13


SELECTED AREA
PUMP HOUSE
DADU CANAL
PROPOSED DISTRIBUTORY
Moenjo Daro Dy
Tatri Minor
Qabula Minor
Almani Mr
Karni Minor
Butra Mr
Moenjo Daro
B
Wehar Minor
Wehar
Gaji dero Minor
Fatehpur Mr
INDUS RIVER
N
LEGEND
BOUNDARY OF SELECTED AREA
BUNDS
CANALS EXISTING
CANALS PROPOSED
CONTOUR
PRESENT COMMAND BOUNDARIES
SCALE 1 40,000
0 2000 10,000 feet



for ground-water control alone will provide material benefits to a populace of nearly 10,000 souls. In combination with the river training works, it may effect the life, land and well-being of many more.

Salient Features of the Project for Controlling the Water-table at Moenjodaro

	Area A	Area B
STAGE I		
Number of wells	14	—
Depth of water-table to be maintained (ft)	20	—
Capital cost of wells	2,828	—
Total annual cost	571	—
STAGE II		
Number of wells	12	13
Depth of water-table to be maintained (ft)	32	20
Capital cost of wells	2,424	2,630
Total annual cost	969	374
STAGE III		
Number of wells	30	39
Depth of water-table to be maintained (ft)	65	70
Capital cost of wells	6,058	7,874
Total annual cost	1,834	1,548

	Area A	Area B
CAPITAL COSTS		
Wells	11,310	10,504
Disposal system	6,957	5,218
Electrification	1,662	830
Other works	1,596	—
Total capital cost	21,525	16,552
FOREIGN EXCHANGE COMPONENT		
Rupees	11,672	9,738
Dollars*	1,057	882
AGRICULTURAL DEVELOPMENT		
Culturable commanded area	9,700 acres	
Total capital cost on irrigation works	3,881	
Net return to farmer per acre:		
Present	0.058	
Ultimate	0.765	
Government income from direct taxation	1.160	

ACKNOWLEDGEMENTS

The authors wish to thank the United Nations Educational, Scientific and Cultural Organization, Paris; the Water and Power Development Authority of Pakistan, Lahore; Messrs Hunting Technical Services Limited and Sir M. MacDonald and Partners of London and the NEDECO Engineering Consultants of the Hague for kind permission to quote and reproduce from their publications.

* Parity exchange rate, 1 U.S. dollar—11.04 rupees.
All costs in thousand rupees.

Proposal for area B is only approximate.
Total annual cost includes provision for sinking fund.

Protection against River Erosion

Ch. Mohammed Ali

MOENJODARO is situated on the right bank of the River Indus about 70 miles below Sukkur Barrage. The Indus is a meandering river with an ever shifting course and its discharge changes from year to year. The river opposite Moenjodaro flows in a wide *khadir*, with a two channel course, thereafter flowing into a confined narrow channel after leaving the loop opposite Moenjodaro. There are a number of crisscross *bunds* on the right bank of the river in this area. These *bunds* are meant to protect the area against spill flows and not against any direct attack of the river.

A perusal of the Indus River survey plan downstream of Sukkur Barrage for the years 1950 to 1970 reveals that:

(a) The river bend immediately downstream of Sukkur Barrage determines the course of the river lower down.

(b) The river is pinned down during all these years at fixed point A (opposite Abad Link bund) above cross-section line No. 12 (Fig. 1).

(c) The river bend between section line 6 and 10, has been there during the year 1950 to 1970, with its concave bank located towards the left flank of the river. This bend has been oscillating laterally, and the radius of the bend has been changing from a minimum value, when the apex of the bend was approaching the left high bank of the river, to a maximum value, when the apex of the bend shifted towards the right bank to its maximum distance from the left high bank. This bend determines the course and the discharge of the two channels in the next lower bend which faces Moenjodaro.

In the year 1962-63 the apex of the bend between cross Section 6 and 10 was nearest to the left high bank and its radius was at a minimum value. The river was at a maximum distance from Moenjodaro in that year.

(d) The river has been flowing in a narrow gullet downstream of Section 5. The two banks of the gullet have shown little change during these years.

Inspection of the site has indicated that:

(a) B, C and D are hard points on the right bank and appear to have been almost firm during the last 20 years.

(b) It was reported by the boatmen and staff of the Archaeology Department at the site that there is a wall in the direction of flow with a 6 ft. top width and a top level below the low existing winter level. This wall is in the vicinity of point 'D'.

(c) The main course of the river at present is away from the right bank is opposite points B, C and D, and is drifting away from the right bank.

(d) The shallow channel along the right bank, which is drawing about 10 per cent of the river discharge, is silting up as its offtake point is located on the inside of the bend of the main channel.

The system of training works for the protection of Moenjodaro should be on a permanent footing, so that:

(a) It pins down the extreme limit of the current at an optimum safe distance from the right existing edge of the river.

(b) The river training system is subject to the least possible severity of attack during its life-span, so that only minimal maintenance is required.

(c) The system does not create any erosion problem elsewhere.

The model tests were taken up on a 1/200 horizontal and 1/25 vertical scale. The adequate system of training spurs evolved as a result of model studies is given in Figure 2, and it comprises:

The Spur: It is a hockey cum T cum sloping spur (Figure 3) of the type constructed recently above Cheshma and Taunsa Barrages on the Indus.

The T part (main body) of the spur, which is 2500 feet in length, guides the flow to a pre-specified course.

The hockey component, which is about 1300 feet in length, caters for any deep embayment above the spur, and can take attack from a wide angle. The sloping tail end (on a taper of 1 vertical to 8 horizontal) of the spur wards off the secondary current offtaking from the tail and of the spur from the D/S face of the earthen shank of the spur.

The main objective of this spur is to avoid any outflanking of guide bank, and to minimise chances of attack of flow in the back side of the guide bank head which is inimical to the safety of the guide bank.

The Guide Bank: Bell's guide bank is generally used for training a river through a bridge or a barrage, but this type of guide bank can also be used for protecting long distance of the eroding edge of a river.

A single guide bank on the outer side of a river bend has been successfully used on the Sutlej at the crossing point of the Sui Gas pipeline and on the Indus for protecting Hala town.

The geometry of the proposed guide bank for protecting Moenjodaro is given in Figure 4. It is 4000 feet in length and gradually diverges out wards. The back side of the guide bank, at head and tail, has been stone armoured to a length of 600 feet for protection against any back eddy or boiling action. This guide bank provides protection to the right bank of the river up to and beyond Section No. 5 (Figure 5) and guides the flow into the gullet smoothly.

The apron has been designed on the basis of prototype observations of the scour along the stiff clay bank in the gullet below Section 5. The scour calculations are based on the standard formula, and estimations of scour has been made on a model.

The proposed system is considered to be a foolproof and permanent means of training the Indus for the protection of Moenjodaro.

Estimate for Construction of Stone Pitched Spurs opposite Moenjodaro for Protection Against River Erosion

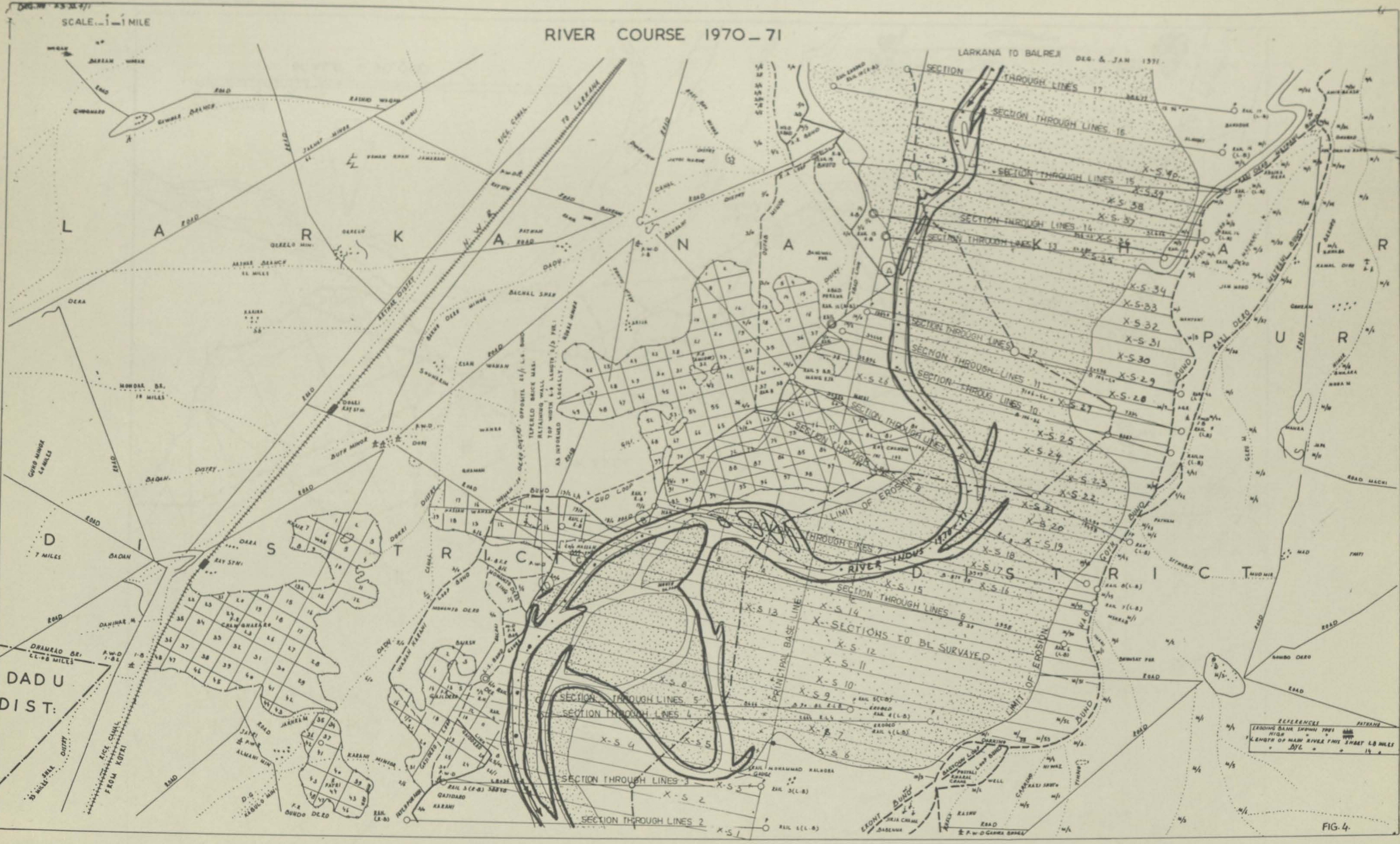
Quantity	Item	Rate per	Amount
1,00,50,000 Cubic feet	Earth work from outside barrow pits for constructing shanks and spurs portions by machines including extra lead and lift, consolidate and compaction etc. complete.	100/-%	1,00,50,000
70,20,000 Cubic feet	Laying stone pitching and apron for the spurs including supply and carriage of stone material to site from Sukkur/Rohri quarry.	120/-% C.ft.	84,24,000 C.ft.
Job	Wire Netting (Crates) to the armoured slope and apron	L.S.	20,00,000
4 Miles	Construction of metalled asphalt road from Moenjodaro to site.	7,00,000 Miles	28,00,000
Job	Construction of Buildings at Site for staff, labour, temporary power house etc.	L.S.	2,00,000
	Total:		234,74,000
	Add 5% Contingencies		11,73,400
			2,46,47,400
	Add 27% for execution charges		67,78,035
	G. Total		314,25,435
	Say Rs.		3,15,00,000

Note: 30% may be kept as foreign exchange component.

SADIQ ALI MIRZA
Executive Engineer,
Northern Dadu Division,
LARKANA

S. A. RASHID
Superintending Engineer,
Nara Canal Circle,
HYDERABAD

Figure 1


RIVER COURSE 1970_71
SCALE 1" = 1 MILE
LARKANA TO BALREJI DEC. & JAN. 1971
L A R K A N A
D I S T R I C T
K H A I R P U R
D I S T R I C T
DADU DIST:
RIVER INDUS 1970-71
LIMIT OF EROSION
PRINCIPAL BASE LINE
X-SECTIONS TO BE SURVEYED
SECTION THROUGH LINES 17
SECTION THROUGH LINES 16
SECTION THROUGH LINES 15
SECTION THROUGH LINES 14
SECTION THROUGH LINES 13
SECTION THROUGH LINES 12
SECTION THROUGH LINES 11
SECTION THROUGH LINES 10
SECTION THROUGH LINES 7
SECTION THROUGH LINES 6
SECTION THROUGH LINES 5
SECTION THROUGH LINES 4
SECTION THROUGH LINES 3
SECTION THROUGH LINES 2
TO LARKANA
RICE CANAL
FIG. 4.

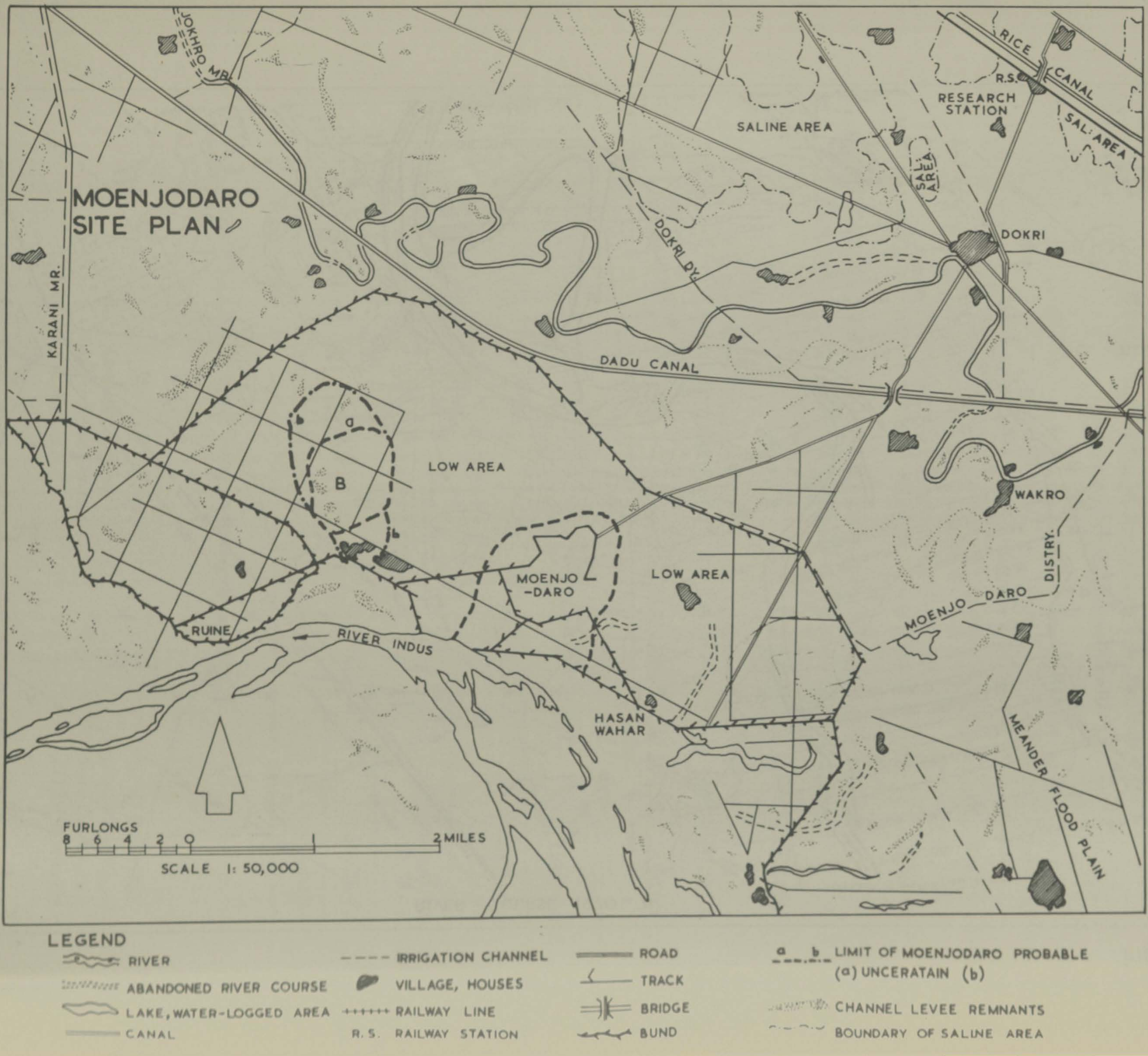
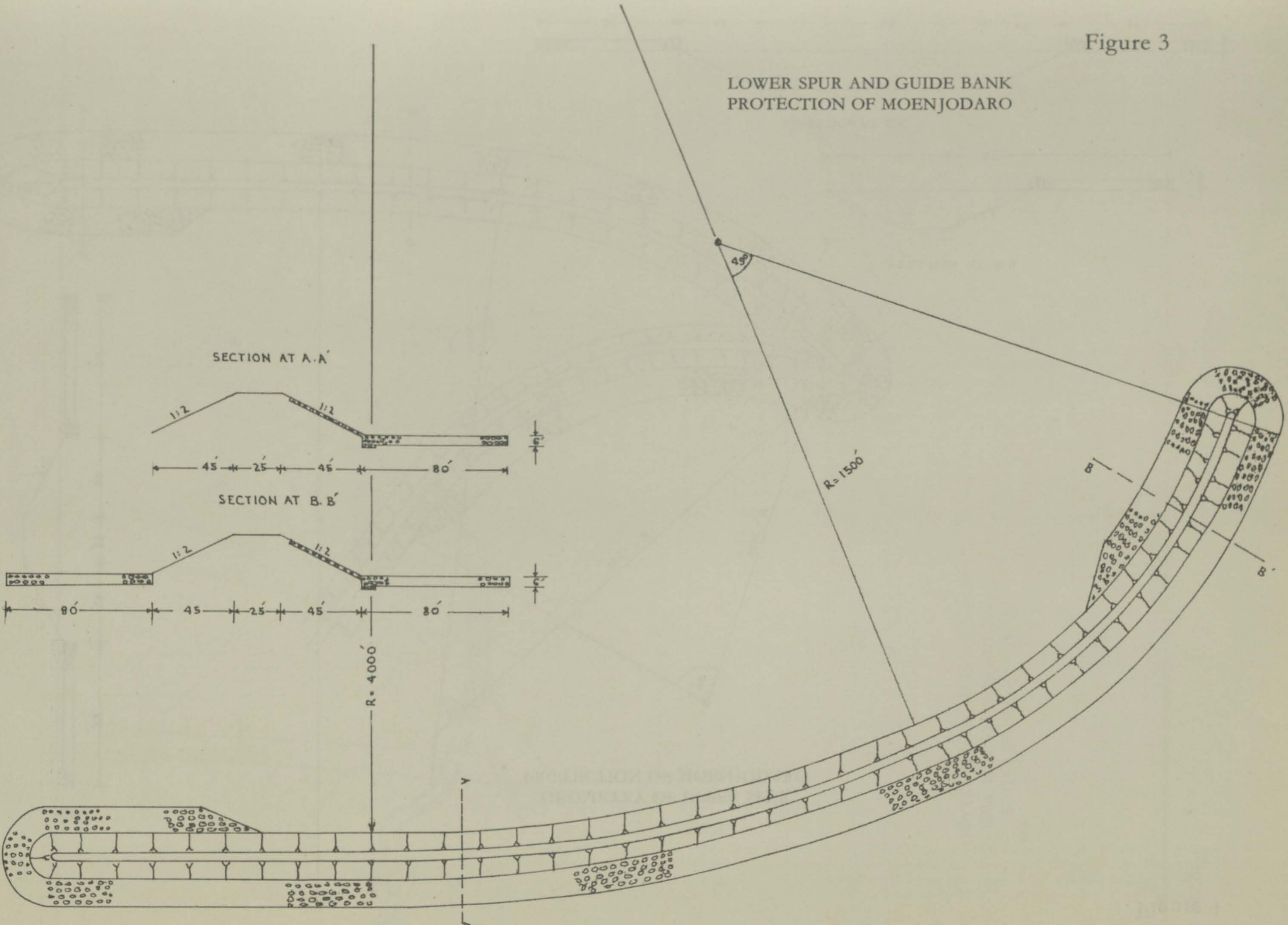

MOENJODARO
SITE PLAN
JOKHRO MR.
KARANI MR.
RICE CANAL
R.S.
RESEARCH STATION
SALINE AREA
SAL. AREA
SAL. AREA
DOKRI DY.
DOKRI
DADU CANAL
LOW AREA
a
B
b
MOENJO -DARO
LOW AREA
WAKRO
DISTRY.
MOENJO DARO
RUINE
RIVER INDUS
HASAN WAHAR
MEANDER FLOOD PLAIN
FURLONGS
8 6 4 2 0
2 MILES
SCALE 1: 50,000
LEGEND
RIVER
ABANDONED RIVER COURSE
LAKE, WATER-LOGGED AREA
CANAL
IRRIGATION CHANNEL
VILLAGE, HOUSES
RAILWAY LINE
R. S. RAILWAY STATION
ROAD
TRACK
BRIDGE
BUND
a b LIMIT OF MOENJODARO PROBABLE
(a) UNCERATAIN (b)
CHANNEL LEVEE REMNANTS
BOUNDARY OF SALINE AREA

Figure 3

LOWER SPUR AND GUIDE BANK
PROTECTION OF MOENJODARO



GEOMETRY OF UPPER SPUR
PROTECTION OF MOENJODARO

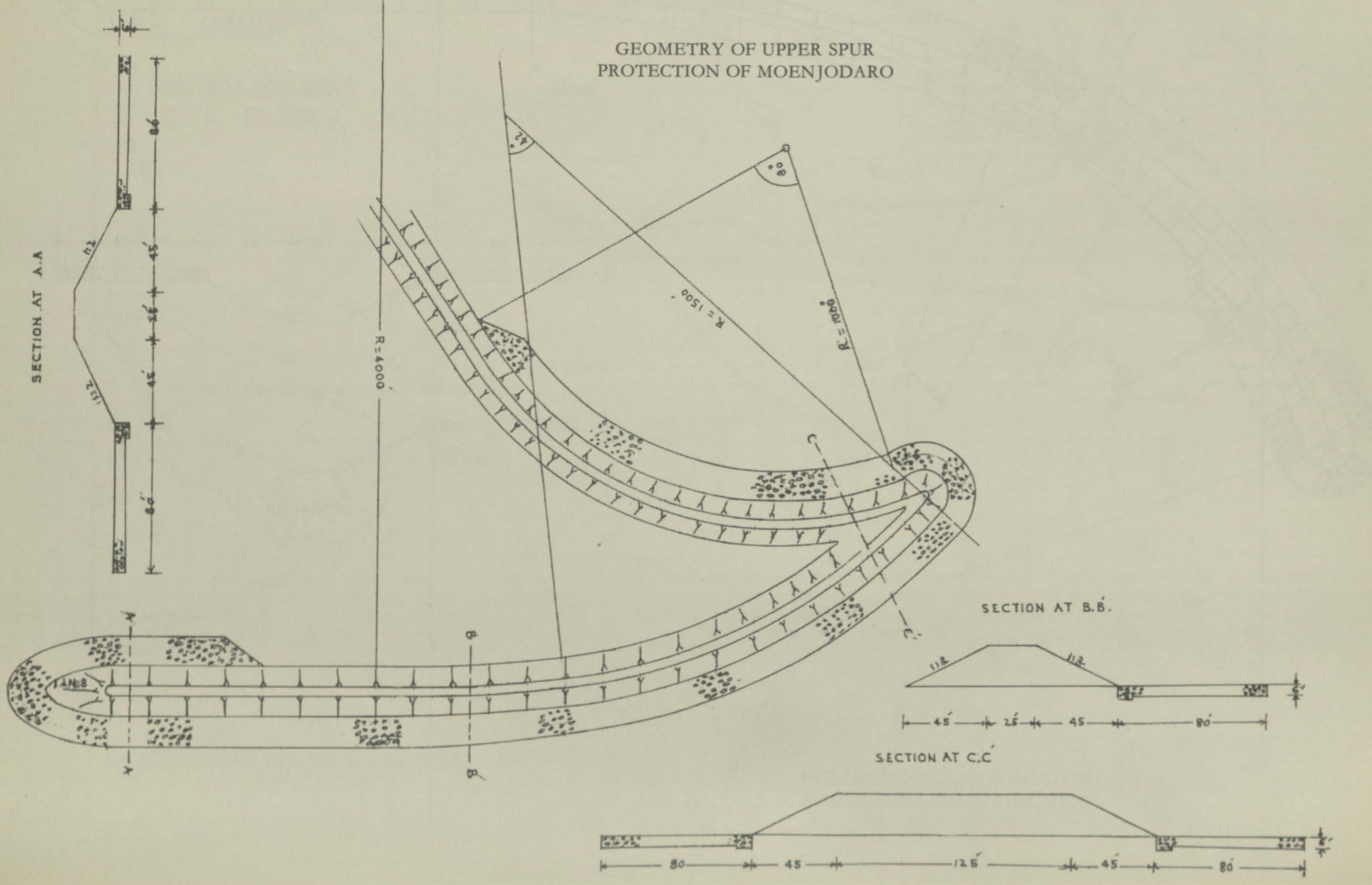
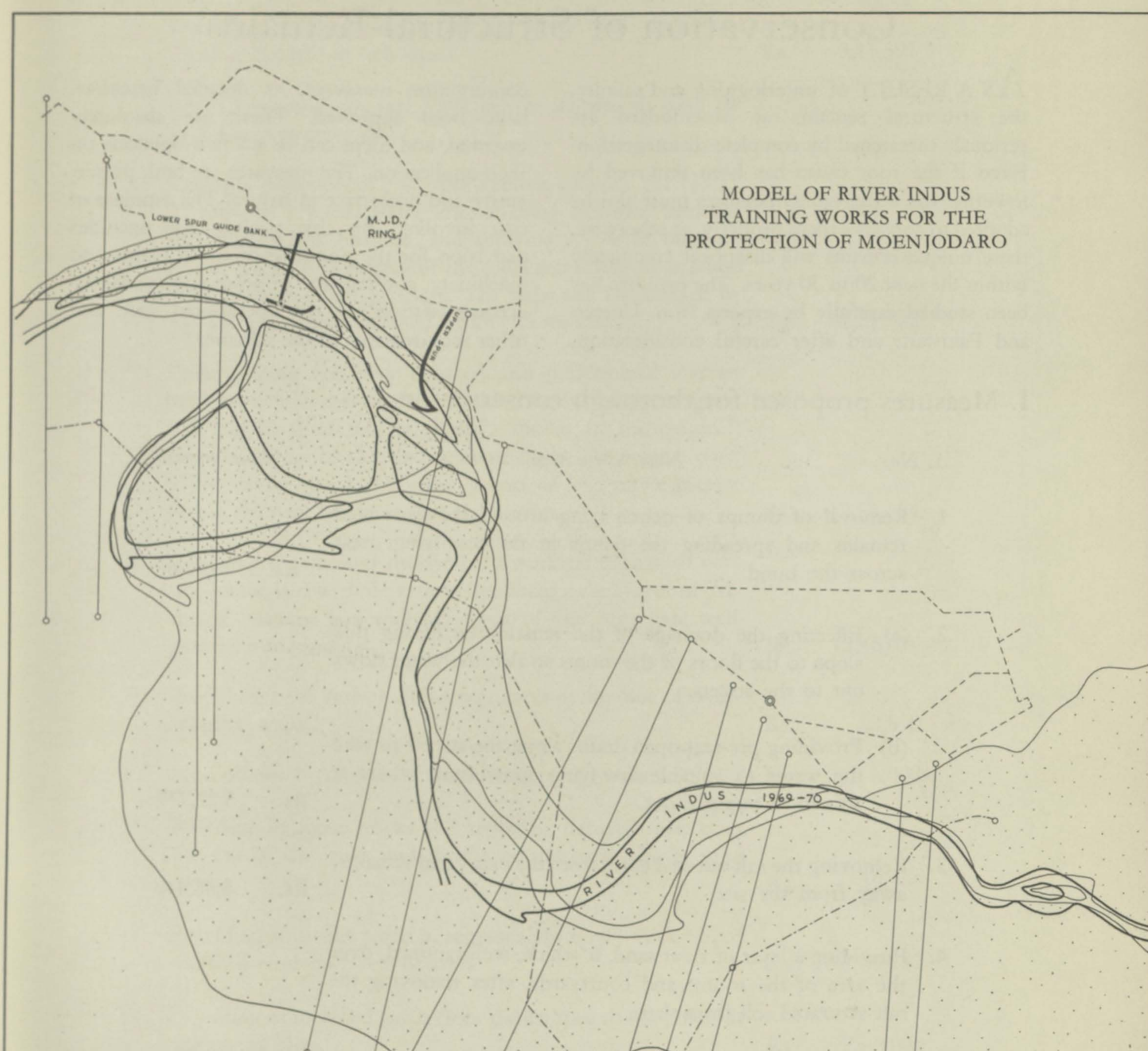


Figure 5


MODEL OF RIVER INDUS
TRAINING WORKS FOR THE
PROTECTION OF MOENJODARO
LOWER SPUR GUIDE BANK
M.J.D. RING
UPPER SPUR
RIVER INDUS 1969–70

Conservation of Structural Remains

As A RESULT of waterlogging and salinity, the structural remains at Moenjodaro are seriously threatened by complete disintegration. Even if the root cause has been removed by lowering the water-table, measures must also be adopted to conserve them properly, as otherwise, these unique remains will disappear completely within the next 20 to 30 years. The problem has been studied carefully by experts from Unesco and Pakistan; and after careful consideration, conservation measures, as detailed hereafter, have been approved. These are absolutely essential, and there can be no two opinions on their application. The measures are both preservative and protective in nature. The estimate of cost involved on this project also includes provision for the purchase of tools, plants and machinery, construction of office and residential accommodation for the operational staff, and other requirements of the scheme.

I. Measures proposed for thorough conservation

S. No.	*Name of the item*		*Cost involved*
1.	Removal of dumps of debris lying around the excavated remains and spreading the debris in the low-lying areas across the bund.	Rs.	15,72,60
2.	(a) Effecting the drainage of the remains by giving due slope to the floors of the rooms so that the water flows out to the streets.		
	(b) Providing pre-cast open drains along the streets to take the water to suitable low-lying spots from where it should be pumped out.	Rs.	5,22,777
3.	Removing the salt-affected earth from the excavated remains, away from the site.	Rs.	6,46,440
4.	Providing a layer of river sand, 6″-thick, well-rammed, over the area of the rooms and courtyards, after removing the salt-saturated soil from there. *Note*: *Experiments should also be carried out with a 3″-thick layer of well-rammed sand underneath and a 3″-thick layer composed of 4 parts of river sand, one part clay and 3/4 part quick lime mixed together and spread over the floor of the rooms etc.*	Rs.	1,85,851
		Total Rs.	15,52,328
			(Carried over)

		B.F. Rs.	15,52,328
5.	Providing mud capping on the top of the walls with sun-dried bricks laid in two layers. *Note: Temporary measures which will be discontinued when the salts have been controlled.*	Rs.	3,17,391
6.	Laying a damp-proof course in cement concrete ($1: 1\frac{1}{2}: 3$), 3"-thick in pre-cast slabs, after making incisions into the masonry for the purpose, and applying a coat of bitumen on the unexposed surface of the slabs and filling their joints with bitumen under pressure. The slabs will be recessed by $4\frac{1}{2}$" and the surface finished with brick masonry.	Rs.	45,51,522
7.	Underpinning the very decayed and undermined ancient brickwork with newly manufactured bricks of the original size laid in mud mortar, exactly similar to the original, though distinguishable through date cards. The inner surface of the cavity should be given a coat of 5% vinyle acetate before the new bricks are set in position.	Rs.	62,96,364
8.	Restoring the cut and rubbed brickwork on edge with very fine joints, laid without mortar but based over a layer of pre-mixed bitumen concrete $1\frac{1}{2}$" -thick of fine aggregate well-pressed into position.	Rs.	12,46,014
9.	Providing mud *pushtas* with sweet earth at the base of over-hanging walls.	Rs.	12,800
10.	Mud plaster 1" -thick over the surface of the walls.	Rs.	6,000
11.	Resetting of loose bricks and replacing decayed ones over the top of the walls with bricks of the same size in mud mortar.	Rs.	19,905
12.	Providing approach paths in cement slabs on 9"-thick boxed and well-rammed layers of sand.	Rs.	1,09,147
13.	Providing of metalled roads from the campus to the different excavated sites.	Rs.	2,00,000
14.	Plantation of short-root and salt-eating plants in open areas, such as the Chief's square.	Rs.	50,000
	20% Contingencies.	Rs.	31,47,768
		Grand Total Rs.	1,88,84,587

Inundated field with the remains of Moenjodaro in background.



Tools, Plants and Machinery

S. No.	Name of the item	Approximate cost
1.	Chemist's laboratory with equipment and furniture	Rs. 30,000
2.	Grouting Machines (2)	Rs. 4,000
3.	Alcon Pumps (10)	Rs. 6,000
4.	Pug Mills (2)	Rs. 5,000
5.	Land Rover with Trailer	Rs. 1,00,000
6.	Implements, Drawing and Survey equipment, Photographic materials etc.	Rs. 1,00,000
7.	Furniture and office equipment	Rs. 20,000
8.	Telephone connection	Rs. 25,000
	Total Rs.	2,90,000
	Add 20% Contingencies	Rs. 58,000
	Grand Total Rs.	3,48,000

Office and Residential Accommodation for the Project Staff

S. No.	Name of the building	Area in sq. ft.	Approximate cost
1.	Residence for Project Director and Deputy Director	5,000	Rs. 1,50,000
2.	Residence for three Class II Officers	5,000	Rs. 1,50,000
3.	Office-cum-residential two-storeyed building	5,000	Rs. 3,00,000
4.	Block for Class IV staff	3,500	Rs. 1,00,000
5.	20% contingencies		Rs. 1,40,000
		Total Rs.	8,40,000

The cost of construction has been charged at Rs. 30/- per sq. ft.

Staff Required for Conservation

S. No.	Name of the post	No. of posts	Scale of pay	Remarks
	I. Technical Staff			
1.	Project Director	1	Rs. 1200-100-1600	Field archaeologist with experience in conservation.
2.	Deputy Director	1	Rs. 750-75-1500	Engineer with experience of archaeological conservation.
3.	Asstt. Archaeological Chemist	1	Rs. 450-50-1000	
4.	Archaeological Conservator	4	Rs. 350-35-525-EB-40-925	
5.	Conservation Assistant	4	Rs. 250-18-340-EB-20-440-EB-20-540	
6.	Surveyor	1	Rs. 225-15-300-EB-16-380-EB-20-480	
7.	Senior Draftsman	2	Rs. 225-15-300-EB-16-380-EB-20-480	
8.	Photographer	1	Rs. 250-18-340-EB-20-440-EB-20-540	
9.	Photoprinter	1	Rs. 150-6-180-EB-8-220-EB-10-280	
10.	Driver-cum-Mechanic	1	Rs. 150-6-180-EB-8-220-EB-10-280	
	II. Administrative Staff			
1.	Administrative Officer	1	Rs. 350-35-525-EB-40-925	
2.	Store Officer	1	Rs. 350-35-525-EB-40-925	
3.	Head Clerk	1	Rs. 200-12-260-EB-15-335-EB-15-425	
4.	Accountant	1	Rs. 275-20-375-EB-20-475-EB-25-600	
5.	Cashier	1	Rs. 200-12-260-EB-15-335-EB-15-425	
6.	Steno Typist	2	-do-	
7.	U.D.C.	2	Rs. 180-10-230-EB-10-280-EB-15-370	
8.	Stenographer	1	Rs. 275-20-375-EB-20-475-EB-25-600	
9.	L.D.C.	6	Rs. 150-6-180-EB-8-220-EB-10-280 (including four posts for Archaeological Conservators)	
10.	Daftry	1	Rs. 100-2-116-EB-3-140	
11.	Peons	4	-do-	
12.	Farrash	1	-do-	
13.	Chowkidars	2	-do-	
14.	Sweepers	2	-do-	

Expenditure on execution for 5 years.

Pay	Rs.	5,77,000
T.A.	Rs.	50,000
Contingencies	Rs.	75,000
Total	Rs.	7,02,000

Summary of the Cost Involved

1.	Conservation of structural remains	Rs.	1,88,84,587
2.	Tools, Plants and Machinery	Rs.	3,48,000
3.	Office and residential buildings for the Project Staff	Rs.	8,40,000
4.	Expenditure involved on the pay of staff engaged in the execution of the project and office contingencies for a period of 5 years	Rs.	7,02,000
	Grand Total	Rs.	2,07,74,587



Promotion of Cultural Tourism

MOENJODARO is not a matter of a lost culture in a dead city. The ruins at Moenjodaro represent the remains of a people who founded and developed a civilization that was almost certainly the most advanced of its kind at the time. Who were these people? What was their mode of living? What were they like? What can we learn from a study of their civilization? It is around these and similar questions and possible answeres to them that the plan for the development of cultural tourism has to be devised. It aims at re-emphasizing and bringing back to life the link with the past that Moenjodaro represents. It aims at making it possible and popular for larger number of tourists to get to know and share this heritage. The plan proposes the development of:

(a) Transport to and in the area;
(b) Accommodation;
(c) Audio-visual exhibitions;
(d) Recreation and entertainment;
(e) Cultural and educational programmes;
(f) Folk art and handicrafts;
(g) Guided tours;
(h) Villages in the area.

Considerable emphasis has been laid in the plan on the social and economic needs of the people of the area. The pattern of development proposed will ensure that the people of the nearby villages and towns benefit directly from it. The development proposed in this plan will thus:

(a) provide employement to the people of the region;

(b) train local people in a wide variety of useful skills;

(c) inject tourist money into the local economy;

(d) provide a basis for other development work in the area.

Unesco's sponsorship of the international assistance required to do this is essential as Pakistan's own limited resources and the reluctance of the private sector to invest in a project of this nature could, without such assistance, result in the project not being financed. The plan that follows is in an outline form. A detailed plan will be presented for approval after the plan in outline is accepted.

Scope for Development of Cultural Tourism

Moenjodaro is already well-known as a centre of one of the world's earliest known civilizations. Moenjodaro will become even better known as a result of the world-wide publicity that the 'Save Moenjodaro Fund' campaign would generate. The temple at Abu Simbel in Egypt became better known as a result of the campaign to save it from being submerged under the waters of the Aswan Dam Lake. There is always a great deal of international interest in significant centres of ancient civilizations and the 'Save Moenjodaro' campaign will put Moenjodaro more boldly on the world tourism map.

There is already a 5,000 feet long jet runway at Moenjodaro and the resurfacing of the runway is scheduled for completion before the end of this year. There is enough additional space around the runway for it to be extended to take even the large aircraft. There are at present three flights to Moenjodaro in a week. Approximately 20,000 visitors a year are attracted, and this figure can increase rapidly as soon as (a) the frequency of flights to Moenjodaro is increased, (b) the tourist resort complex is constructed, (c) package tours by air, rail and road routes are organized and (d) the potential of charter group is tapped.

Other places of touristic interest in the Moenjodaro region include the following:

(a) Sattin-jo-Asthan (Place of Virgins) with its unique graves;

(b) The island of SAADB BELA (in the Indus between Ayub Bridge and Lloyed Bridge);

(c) THE FAMOUS MAZAR (MAUSOLEUM) OF LAL SHAHBAZ QALANDAR AT SEHWAN SHARIF (with its annual Urs, 'memorial congregation', to which hundreds of thousands of people come);

(d) The Kot Diji excavations and fort (constructed by the Mirs of Khairpur);

(e) LANG LAKE and DRIGH LAKE (which are good points for observing ducks in winter and are within a radius of 30 miles from Larkana town);

(f) The mountain region centred around KUTTEY-JI-KABAR (which can be developed into a hill station as proposed earlier by the Government);

(g) The fort at RUNNY KOT (which is about 12 miles off the Indus Highway in the Dadu District and forms what is probably the largest totally enclosed perimeter of its kind in the world, with the wall extending a distance of approximately 250 miles);

(h) GORAKB JABBAL (which is in the Kirthar Range in an area rising to nearly 6,000 ft. above sea level and has almond and fig orchards and gets snow fall in winter);

(i) The ruins that lie to the right of the area defined by the DAMRABA BRIDGE on the Indus Highway and the Damraba Regulator on the Rice Canal (which though presently mostly unexcavated, are believed to be as large as those at Moenjodaro);

(j) The ruins at Jukhar-do-Daro (which are about 7 miles north of Larkana on the Indus Highway and include a stupa of the same kind and as large as the one at Moenjodaro);

(k) BABI-JA-KUBAZ and BANDBO KUBO (which lie between Ratto-dia Taluka and Garhi Yasin near Larkana);

(l) MIRAN-JA-KUBAZ tombs in Hyderabad (which is on the direct route from Karachi to Moenjodaro);

(m) MIRWAN KUBAZ tombs (which are located at the foot of the Kirthar range in the Gulmohanji Pat area of Dadu District and are amongst the finest of their kind in the country);

(n) THE MAZAR (MAUSOLEUM) OF PIR SHAB GODRIA AT GODRIA (which is just off the Indus Highway from Mehar, near the Nasirabad turn off for Dokri and Moenjodaro);

(o) The Sulphur springs at LAKKI SHAB SADAR (which are near Lakki Railway Station on the Larkana-Kotri railway line);

(p) MANCHAR LAKE (which is near Bubak in the Dadu District);

(q) HAMAL LAKE (which adjoins Shah Godria in the Larkana District and is connected to the Indus Highway by road from Nasirabad);

Group tours to Moenjodaro would include

interesting combinations of visits to some of these places as part of the package. For this purpose, particular attention would be paid in future development plans to the construction of tourist facilities at Sehwan Sharif to handle more effectively the very large domestic traffic that already exist and the additional foreign and domestic traffic that will flow into the area as a result of overland tours.

In addition to overland tours by road, tours by rail can also be conducted. Special railcar service would be run from Karachi, with an overnight stop at Moenjodaro. Airconditioned railcars (which are already available in the country) could be used for this purpose to ensure full passenger comfort in the summer months. Furthermore, the Government is prepared to allow charter flights for tourists in Pakistan. As soon as the facilities to handle a larger number of tourists are developed, Jumbo jets charter flights will become part of this traffic. There are a large number of jumbo jets operating world-wide today, with each charter jet carrying upon 450 passengers. Should even a fraction of this charter traffic be promoted into Pakistan, the additional inflow of tourists will be quite large, and many of these tourists can be expected to include Moenjodaro in their itineraries. In addition to this, an increase in domestic tourist traffic into the area is also expected.

In addition to the publicity that will be generated by the 'Save Moenjodaro' campaign, we plan to launch simultaneously our own campaign to popularize Moenjodaro and publicize we propose to build there.

The Site for the Cultural Resort Complex

None of the proposed structures will exceed a height of 24 feet. When this yardstick is considered in conjunction with the location of the resort site (which is situated within the trapezoidal perimeter defined by the Sehwan Bund to the west, the F.G. Link Bund to the south and the Hassan Wahan Loop Bund to the east and north), it becomes clear that the tourist complex buildings will be totally hidden from view, from the excavations, even when viewer is standing at the highest point in the excavations area. Thus there will be no intrusion whatever in his visual horizon to detract him from the archaeological vista.

This aspect of the proposed resort is further safeguarded by the fact that the site chosen for it (within the trapezoidal perimeter) is itself somewhat low-lying and well below the general ground level of the excavations area. Specifically, this site is located adjacent to the point (mile 0/4) where the Hassan Wahan Bund sharply changes direction to head due south. The total area enclosed within the perimeter is several hundred acres. Of this, the tourist complex will require only a few acres in the first phase and there will thus be plenty of land available for expansion. The other advantages of this site are that it is:

(a) Only two furlongs (400 metres) from the existing airport building;

(b) Very close (200 metres) to the D.K. area of the excavations;

(c) Connected by the Hassan Wahan Bund Road (1,000 metres) to the VS and HR areas of the excavations;

(d) Easily reached from SD (Stupa) area via the airport road (1,500 metres);

(e) Conveniently located for the supply of electricity from the existing 11 K.V. line that runs between the H.R. and V.S. areas to the Hassan Wahan Bund;

(f) Easily served by extensions to the existing telephone line that runs close by;

(g) Connected by the Hassan Wahan Bund Road and onwards by the Sehwan Bund

Road to Hassan Wahan (a village that can be developed into a place of considerable tourist interest).

The other factor which needs to be considered is the water supply to the proposed resort site. WAPDA has a plan to instal two 8-inch tube-wells of 3 cusecs capacity each as a first step in the ground-water control plan. WAPDA has proposed that these two wells be financed from domestic resources . and the Ministry of Education has already been approached for assistance.

The Archaeological and Cultural Concept

The plans for the tourist resort at Moenjodaro will appropriately respect the integrity and character of the site and its surrounding landscape and environment. With this in view, efforts will be made to make the proposed resort reflect (on a small scale) parts of the ancient city of Moenjodaro. Limited only by the requirements that modern utilize (airconditioning, plumbing, etc.) may impose, the layout of the resort, the grouping and the architectural pattern of structures will be designed to follow the pattern of the original city.

WAPDA will be raising a few buildings for construction staff employed to carry out the ground-water control project. The buildings will be occupied by WAPDA for the duration of the project and become available for other use when the project is completed. We will request WAPDA to construct this camp so as to ensure that the structures are built on the same pattern as the proposed resort and can form part of it when they are no longer required by WAPDA.

This basic concept will determine the touristic approach to this entire area and will not be confined only to the complex itself. For this purpose, the road coaches and railcars carrying tourists to Moenjodaro will be done up as mobile audio-visual exhibits and the presentation equipment installed in such transport will be used in gradually introduce the tourist to history of the INDUS VALLEY CIVILIZATION, MOENJODARO and its surrounding area.

Similarly, tourists coming in by air will be introduced to Moenjodaro through audio-visual material while they are still on board the aircraft. MOENJODARO AIRPORT will also be integrated into this scheme, a major portion of it forming a visual display of Moenjodaro Murals, three dimensional reconstructions, panels in terracotta relief, paintings, artifacts (replicas), souvenir shops, boutiques and other elements.

A visitor welcome service may also play a key role in the Moenjodaro project. Fully trained guides (*rehbars*) will be stationed at Moenjodaro to conduct tourists around the excavations and to look after them throughout their stay.

Tours through the excavations area will generally follow the pattern suggested by Mr. Raoul Curiel and Mr. R.M.H. Mangee in Unesco's Report No. 176-RD/GIT of September, 1967. Most of the other proposals for the presentation of the area will be in general conformity with the Unesco Report.

Cost of the Resort Complex: First Phase

The estimates that follow are based on the provision of accommodation initially for a hundred persons. This will be expanded in the second phase to accommodate two hundred persons. The third phase will provide for 500 persons at a time. These cost estimates are of a rough nature and are designed to present a general idea of the financial implications of the proposed resort. Detailed studies reflecting definitive costs will be prepared when the detailed architectural and engineering design and specifications are prepared.

Based on the traffic we hope to develop in the first phase, the main accommodation area at Moenjodaro will initially consist of 40 double and 20 single rooms with related public rooms and other facilities, including:

(a) Swimming pool, which will exactly duplicate the Great Bath at Moenjodaro;

(b) Tennis courts;

(c) Squash courts;

(d) Indoor games room;

(e) Restaurants;

(f) Shopping arcade (designed in the style of the main marketplace of the ancient city);

(g) Multi-purpose, fully equipped auditorium (this will seat 400 people and will be used for film shows, folk dances and music programmes based on life as it was lived in the ancient city and other programmes of interest to domestic and foreign visitors);

(h) All the other facilities normally included in first class hotel/resort areas.

Preliminary Estimate of Capital Requirements For the Resort (First Phase)

Summary	*Rs.*
1. Land (15 acres at Rs. 1,000 per acre).	15,000
2. Site improvements.	2,00,000
3. Building construction (including swimming pool, auditorium and other facilities) at an average Rs. 30.35 per square foot of covered area.	28,50,000
4. Furniture, fittings and equipment (including airconditioning equipment).	9,00,000
5. Contingency.	75,000
6. Architectural and engineering services (including supervision during the construction period).	2,00,000
7. Organization and development costs.	15,000
8. Financing and miscellaneous expenses.	75,000
Total:	43,30,000

Some of the facilities (swimming pool, auditorium, etc.) included in this cost estimate will also serve second phase when the resort is expanded to accommodate up to 200 people at a time. The cost of doubling the capacity of the resort will therefore be much less than that of the first phase. The third phase will, however, need additional expenditure under some of these heads. The second and third phases can be expected to involve a further expenditure of Rs. 1.30 crores, bringing the total investment for phases 1, 2 and 3 to approximately Rs. 1.75 crores.

Cost of the Infrastructure

The Government of Pakistan is planning to give increasing attention and some financial support to the development of the infrastructure needed to support tourism in the area. In spite of its limited resources, the Government has already:

(a) Resurfaced the 5,000 feet long runway of Moenjodaro airport;

(b) Constructed a new airport terminal building;

(c) Allocated Rs. 4 million for improvement of the Larkana-Moenjodaro road;

(d) Installed on 11 K.V. electric power line up to and through the excavations area.

Much of the ground work for the infrastructure needed to support the proposed resort has thus already been done.

The electric power distribution system and the quantity of power that will be available is described in Section 4.5 of the ground-water control plan report and in Figure 4.7. The existing 11 K. V. line to Moenjodaro has enough surplus capacity to meet the power needs of the resort. The only additional work that will have to be done is small extension of less than half a mile to connect the resort site to the existing line feeding the airport. This will be a low tension, 3-strand line and will only require the erection and stringing of 8 or 9 poles. The small cost of this work can easily be met either by WAPDA or the managing company for the resort. In the latter case, contingency provision in the summary of capital requirements (Section 5) can be used for this purpose.

Air, road and rail communications into the area already exist. As stated earlier in this chapter, the existing 5,000 feet long runway is being resurfaced and will be ready by the end of 1972. The existing rail network feeding the area will be able to handle the additional traffic expected to be generated in the first phase of the publicity and promotion plans. At this stage, the only improvement needed in the existing rail facilities is the provision of a parking siding at Moenjodaro (formerly Dokri) railway station to park up to 3 railcar coaches at a time. This siding and its platform can either be financed out of the normal railway development budget or out of a special small fund which could be created for this purpose.

However, the existing road communications to Moenjodaro need to be improved. In addition, approximately 7 miles ($1\frac{1}{2}$ miles in the first phase) of new roads are needed within the excavations—resort-airport area.

There are two main approaches to Moenjodaro from the Indus Highway. The first branches off the highway at Nasirabad (at mile 109 coming from Kotri) for 8 miles (metalled, 12 feet wide) to Budah and then for 6 miles (brick paved, 10 feet wide) to Dokri. From Dokri, it is a further 5 miles to Moenjodaro.

On this route, the brick paved Budah-Dokri section has to be raised, widened to 12 feet and metalled. It is presently at ground level and in a deplorable condition. The existing bridge over the Rice Canal near Budah will have to be widened to 20 feet (at present only 10 feet wide) to allow easy passage to vehicles of all kinds. The cost of this work will be Rs. 18,00,000.00 for the road and Rs. 2,00,000.00 for the remodelling of the bridge, i.e. a total of Rs. 20,00,000.00.

There is no existing financial provision for this work and it will therefore have to be financed separately. This can either be done as a part of the overall Moenjodaro plan or through a special fund to which the Central and Provincial Governments can also contribute.

The other route to Moenjodaro (which is also the one presently used by most vehicular traffic) branches off from the Indus Highway to Larkana. From Larkana, it goes 15 miles to Dokri from where it shares a common alignment of 5 miles with the Dokri-Moenjodaro section of the Nasirabad-Budah-Dokri-Moenjodaro road.

Rs. 40,00,000.00 has already been allocated for the widening (to 20 feet) reconditioning the bad reaches ($2\frac{1}{2}$ miles) and carpeting the entire width from Larkana to Moenjodaro. Of this

total allocation, Rs. 15,00,000.00 is being spent this year.

The carpeting of this road is to be done with Pak. P.W.D. Asphalt Plant now working at Moenjodaro Airport. This work will start as soon as the resurfacing of the airport is completed.

When the Budah-Dokri section of the Nasirabad-Moenjodaro road has been widened and metalled, motor traffic will then use this approach for a total saving of more than 40 miles over the present route to Larkana.

In addition to these improvements, the plan for the Moenjodaro excavations and resort area envisages an internal road network of 7 miles. This includes:

(a) The construction of a road from the airport building to the resort side (2-3 furlongs).

(b) The raising and metalling of the road that presently runs from the Stupa Mound area to the VS and HR areas and on to the Hassan Wahan Bund;

(c) The raising and metalling of the road which runs from the Stupa Mound to the DK area;

(d) The expansion of this road from DK to the resort which will be located north-east of DK;

(e) The raising and metalling of the existing track from Hassan Wahan Village to the airport area.

The first phase of this programme is restricted to 1½ miles of road, made up of the airport-resort road (2-3 furlongs) and the road from Stupa Mound to the HR and VS area and on to the Hassan Wahan Bund (1 mile).

The cost of the first phase, at Rs. 2,00,000.00 per mile, will be Rs. 3,00,000.00. The second phase of 5 miles will cost Rs. 11,00,000.00. With the completion of these improvements and construction of new roads, the excavations-resort area and its surrounding region will be fully equipped to handle all road traffic into the area and also make it easy for tourists to be conducted through the excavation areas.

The approximate cost of this support infrastructure will be about Rs. 3.4 million. This estimate includes only such elements as will need to be specially funded for the development of the Moenjodaro tourism project. It does not include the cost of existing elements nor that of such elements as have already been funded by other agencies as part of their general purpose development plans for the area.

Revival and Promotion of the Folk Arts and Crafts of the Indus Valley Civilization

The wide range of articles and relics of archaeological and antiquarian interest discovered in the ruins (and now displayed in the Moenjodaro Museum located nearby) bear testimony to the fact that the inhabitants of Moenjodaro had a highly-developed aesthetic sense and had mastered the techniques of making a wide range of utility and ornamental articles. These include necklaces and pendants of beads and semi-precious stones, gold armlets, bangles and rings, carnelian beads; ear-rings and anklets, vessels of silver and copper, bronze dishes and spearheads, and knives, saws and razors of the same metals. Chert stone implements, alabaster vessels and polished stone weights of quartzite, alabaster, limestone and jasper have also been discovered.

Numerous objects d'art have emerged from these excavations. Large numbers of burnt clay male and female figurines and models of birds, a steatite bust of a nobleman or a priest-king (wearing a loose robe on which the trefoil pattern

is engraved) and dancing girls in bronze with slim figures and flat negroid features have been recovered. Moenjodaro's figural art is best illustrated by steatite seals bearing lifelike representations of animals and mythological creatures; they also bear short inscriptions in a pictographic script which has not yet been deciphered. A large variety of pottery, both plain and painted, has been discovered. Some examples of this are characterized by decorations on red ware, and others have designs consisting of geometric patterns or stylized human, animal and bird forms and vegetation. Incised and stamped pottery was then obviously in fairly common use.

Some aspects of this fascinating and rich heritage continue to exist in a living form to this day. For example, the bullock-cart (as shown in a photograph) used today in villages like Hassan Wahan, near the excavated area, and in other parts of Sind and the Punjab, is the same as the cart used by the people in the Indus Valley Civilization thousands of years ago. Similarly the shape and texture of certain figurines produced even today by village craftsmen in parts of the Punjab and Sind is identical to the shape and texture of similar figures recovered from the Moenjodaro excavations. There is thus an unbroken link between some of the designs and manufacturing techniques of the Indus Valley Civilization, and the folk crafts of our villages of today.

Many of the ancient crafts are, however, no longer practised.

The revival and promotion of a wide range of Indus Valley folk arts and crafts will:

(a) provide gainful employment for people from the village in and around the Moenjodaro area and other parts of Larkana District;

(b) focus attention on the importance of knowing and preserving this important aspect of our cultural heritage;

(c) inject tourist money into the local economy through the domestic and export sale of the artifacts, pottery, figurines, furniture and other items that will be produced in the arts and crafts centres which it is proposed to develop at Moenjodaro in close collaboration with the Small Industries Corporation of the Sind Government.

The arts and crafts facilities are to be located on a 1½% acre plot of land forming part of the resort. They will be set up in buildings that (like the resort building) reflect the architecture and planning of the ancient city. It is proposed that initially provision should be made for the following facilities:

Design Centre: This Centre will conduct research on traditional ancient crafts and will undertake determination of the exact characteristics of old designs and how best these may be used or adopted for the revival of production. The designs defined by this Centre will also be widely disseminated throughout the region so that craftsmen in other towns and villages may also use these designs and production techniques. The design centre can initially be staffed by persons drawn from the research centre of the Archaeology Department and such other trained personnel as are available in other institutions.

Handicrafts Workshop: This workshop will be attached to the design centre and will undertake the manufacture of prototypes based on the designs defined or evolved by the design centre. The worker in the workshop will be drawn largely from amongst the craft families of the region in order to provide employment to local people. Prototypes will be available for sale and the turnover will help determine which of the prototype items are more popular. This



An impressive street with rows of houses at Moenjodaro.

will be a continuous process to ensure that the items being produced are always those most in demand at any given time both at home and abroad.

Handicraft Shops: There is already a handicraft shop at the Moenjodaro airport. There is also a shop attached to the Archaeological Office at Moenjodaro. However, these shops display their goods in an unimaginative manner and there is seldom, if ever, any change in the items they stock. In order to handle the increased production, and the sales activities likely to be generated, it will be necessary to set up one or more handicraft shops in the proposed resort area. These will form part of the shopping arcade mentioned in Section 5 of this chapter. This shopping area will be built to duplicate, as far as possible, the original main market-place of the ancient city; and its activities will be so organized and conducted as to give the visitor an accurate impression of what it must have been like to shop in Moenjodaro when its civilization flourished. These shops will also buy from local sources and resell to visitors such other items of folk arts and crafts as are generally similar to the ancient ones. This will extend the economic benefits of the project to a wider area.

Training Centres: These development centres are also to be set up in the resort area at Moenjodaro. These centres will enrol talented local boys and girls as trainees on a stipendiary basis and will train them in the following three main areas of folk crafts: (a) Pottery and folk toys, (b) Copper work, (c) Handloom textiles.

Cost of the Folk Arts and Crafts Facilities

The estimates that follow represent the perimeters that may be used at this stage to obtain a general idea of the financial implications of the proposed facilities. Detailed studies reflecting definitive cost will be prepared when the detailed architectural, engineering and equipment designs and specifications have been prepared. These estimates do not include the cost of the support utilities and other infrastructure elements as well as such requirements as are included in the estimate for the resort (Section 5) and the support infrastructure (Section 6).

Design Centre:

	Rs.
1. Land (already accounted for).	—
2. Site Improvements (included in the cost of the resort).	—
3. Building construction.	40,000
4. Handtools and equipment	20,000
5. Furniture and fittings.	15,000
6. Revenue expenditure of establishment and contingency.	30,000
7. Working Capital.	10,000
Total (1)	1,15,000

Workshop:

	Rs.
1. Land (accounted for elsewhere).	—
2. Site improvements (included in the cost of the resort).	—
3. Building construction.	40,000
4. Handtools and equipment.	30,000
5. Furniture and fittings.	15,000
6. Revenue expenditure on establishment and contingency.	30,000

7. Working Capital.	30,000
Sub-Total (2)	1,45,000

Handicraft Shops

	Rs.
1. Land (accounted for elsewhere).	—
2. Site improvement (included in the cost of the resort).	—
3. Building construction (for 3 shops in the first phase).	40,000
4. Furniture and fittings (including display counters and shelves).	30,000
5. Revenue expenditure on establishment and contingency.	10,000
6. Working Capital.	50,000
Sub-Total (3)	1,30,000

Training Centre

	Rs.
1. Land (accounted for elsewhere).	—
2. Site improvements (included in the cost of the resort).	—
3. Building construction.	50,000
4. Handtools and equipment.	50,000
5. Furniture and fittings.	30,000
6. Revenue expenditure on shop and contingency.	30,000
7. Stipends to 20 trainees in each centre at Rs. 30 per month for one year.	21,600
8. Working Capital.	60,000
Sub-total (4):	2,41,600
Total (1-4):	6,31,600

Development of Hassan Wahan Village

The village of Hassan Wahan (connected to the proposed tourist complex area and to the excavation area by the Hassan Wahan Bund Road and the Sehwan Bund Road) is of considerable tourist interest. It is situated on the bank of the Hassan Wahan lake and is less than 2 miles from the excavations and resort area.

The economy of the village is based largely on its people going out to work on the land for farmers elsewhere in the area. They own very little land themselves and try to supplement their income from farm work by engaging in small scale fishing. The income that tourism will generate in the area will therefore make a significant contribution to the economy of the village and help raise the standard of living of its people.

The photographs illustrating this chapter show that the bullockcarts, grain jars and some of the other items in use to this day in the village either duplicate or closely follow the designs of similar objects from the Indus Valley Civilization. This unbroken living link with the past will be fostered, developed and emphasized in such a manner as to attract tourists into the village, some of whom might like to buy local handicrafts and other items of interest.

In addition, guided tours for the village will be organized. Such tours would include the witnessing of various aspects of village life, including a meal with village folk. The meal would be served in the traditional way and would consist of typical village food, provided by the villagers themselves.

Boating, angling and other water sports can be developed on the lake that can also add to the villagers income. Villagers can be employed to act as boatmen and handlers, and can be assisted financially (through long-term, low-interest loans) to build their own boats for use by tourists on payment.

Furthermore, many a people from the areas surrounding Moenjodaro can be trained and employed at the tourist complex. This will provide gainful employment to a significant number, and will be one more way of channelizing tourist money into the local economy.

Transportation within the Resort Area

Fifteen airconditioned mini buses/vans (each seating about 10 or 11 persons) are to be provided for the transportation of tourists within the resort, excavations and the surrounding areas. Tourists will also be able to hire these vehicles for trips to other places of interest in the region.

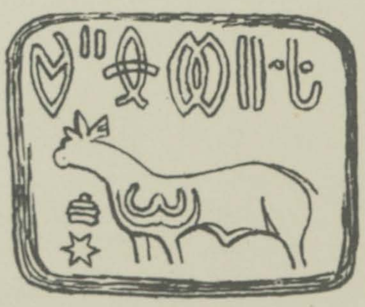
The cost of these 15 vehicles (at Rs. 50,000 each) will be Rs. 6,00,000.

FINANCING PLAN

Summary of Total Cost

	Rs.
1. Resort complex (1st, 2nd & 3rd phases)	1,75,00,000
2. Support infrastructure (1st and 2nd phase)	34,25,000
3. Arts and crafts facilities	6,31,600
4. Fifteen mini buses/vans for transportation within the resort area and its surroundings)	6,00,000
Total:	2,21,56,600
Say:	2,22,00,000

It is hoped that funds for most of the items included will be provided by Unesco over a certain period of time. The remaining part of the costs will have to be met from other sources, local and foreign.



PART TWO

SECTION II: APPENDICES

APPENDIX A

List of Delegates

FOREIGN

1. H.I.H. Prince Takahito Mikasa,
2-1-6 Motoakasaka, Minato-ku,
Minato-ku, Tokyo (Japan).

2. The Right Hon'ble Miss Louise Gore,
2100 Massachusetts Avenue,
N.W. Washington D.C. (U.S.A.).

3. H.E. Prof. Serguefi. Tikhvinsky,
(U.S.S.R.).

4. *H.E. Mr. Tooryalay Etemadi,
C/o National Commission for Unesco,
Kabul (Afghanistan).

5. H.E. Dr. Mehmet Onder,
Under Secretary of State for Culture,
(Kultur Mustesari),
Ankara (Turkey).

6. Sir Mortimer Wheeler, S.Pk.,
British Academy, Burlington House,
Piccadilly, London,
WIV ONS (England).

7. Mr. G. Bolla,
Director, Department for the Preservation
of Cultural Property, Unesco,
Place de Fontenoy,
Paris-7e (France).

8. Prof. and Mrs. Andre Parrot,
11, Rue du Valde Grace;
75005 Paris (France).

9. Prof. Van Lohuizon de-Leeuw,
22 Van Breestraat, Amsterdam,
(Netherlands).

10. *Mr. Raoul Curiel,
10 Bis Rue Pre-aux-clerce,
Paris-7e (France).

11. Dr. Zaky Iskander, Director General,
Department of Antiquities, Ministry of
Culture and Information, Tahrir Square,
Cairo (Arab Republic of Egypt).

12. Mr. Jumaa Mohammad-el-Amaq,
National Museum of Libya,
Tripoli (Libya).

13. Mr. & Mrs. Firouz Bagherzadeh,
Musee Iran Bastan,
Tehran (Iran).

14. Mr. Paul Perrot, Assistant Secretary,
Smithsonian Institution, Washington,
D.C. 20560 (U.S.A.).

15. *Dr. Ch. Mustamindy,
Archaeologie et Conservation des
Sites et Monuments,
Artistiques de Afghanistan,
Darul Aman, Kabul (Afghanistan).

16. Mr. C.C. Th. de Beaufort,
NEDECO, Netherlands Engineering
Consultants, P. O. Box 85.
Amersfoort (Netherlands).

17. Mr. R.M. Lemaire (I.C.O.M.O.S.),
Bertelsheide,
Loonbeek (Belgium).

18. Mr. George Toracca,
Unesco, International Centre for
Preservation and Restoration of
Cultural Property, Via Cavour 256,
Rome 00184 (Italy).

19. Mrs. Virginia Page,
(U.S.A.).

20. *Prof. G. Tucci,
President, Instituto Italiano,
Per il Medio ed Estremo Oriente,
Plazzo Brancaccio, via Merulana
248, Rome 00185 (Italy).

21. *Prof. T. Higuchi,
Leader, Japanese Archaeological
Mission, Koyoto University,
Faculty of Letters,
Kyoto (Japan).

22. *Dr. Mir Hussain Shah,
Dean, College of Letters,
Kabul University,
Kabul (Afghanistan).

23. Mr. Keitaro Hironaga,
Deputy Secretary General of the Japanese
National Commission for Unesco,
Tokyo (Japan).

24. Mr. George F. Dales,
Professor of Archaeology,
Department of Near Eastern Studies,
The University of California,
Berkeley, California, 94720 (U.S.A.).

Pakistan

25. Mr. Tsunehisa Abe,
Tokyo (Japan).

26. Dr. George Macdonald,
National Museum of Open
Canada, Ottawa,
(Canada).

27. *Mr. Justice Feroze Nana Ghulamally,
C/2/4, Bath Island Hill,
Karachi.

28. Mr. Kamal Azfar,
Minister for Finance,
Government of Sind,
Karachi.

29. Syed Amir Ali Shah Jamot, M.P.A.,
Matiari, Hyderabad.

30. Mr. Wahid Bux Bughio, M.P.A.,
New Gad, Dokri,
District Larkana.

31. Miss Taj Bibi Baluch, M.P.A.,
A-54, Fazal House,
Hub River Road,
Karachi.

32. Mr. Q.U. Shahab,
Secretary to the Government of Pakistan,
Ministry of Education, Islamabad.

33. Mr. Inayatullah,
Secretary to the Government of Pakistan,
Ministry of Minorities Affairs & Tourism,
Islamabad.

34. Mr. B.A. Kureshi,
Chairman, Board of Governors,
Lahore Museum,
Lahore.

35. Mr. Mumtaz Hasan,
26/E, Block VI, P.E.C.H.S.,
Karachi.

36. Pir Hussamuddin Shah Sahib Rashidi,
36/5, Amil Colony,
Karachi.

37. Mr. & Mrs. Gulam Mustafa Shah,
Vice-Chancellor,
Sind University,
Hyderabad.

38. Mr. Aftab Ahmad Khan,
Additional Secretary,
Planning Division, Islamabad.

39. Mr. Mahboob Hasan,
Financial Adviser,
Ministry of Education,
Islamabad.

40. Mr. S.A. Naqvi, T.I.,
Director of Archaeology and Museums,
Government of Pakistan,
Karachi.

41. Dr. N.A. Baloch,
Director, Institute of Education and
Research, Sind University,
Hyderabad.

42. *Prof. Dr. A.H. Dani, S.I.,
Dean, Faculty of Social Sciences,
University of Islamabad.

43. Dr. Munawar Khan,
Head of the Department of History,
Peshawar University,
Peshawar.

44. Dr. F. A. Khan, S.I.; T.Pk.,
Former Director of Archaeology,
2/85-L, P.E.C.H.S., Karachi.

45. *Col. K. A. Rashid,
Administrator, Mayo Hospital,
Lahore.

46. Mr. S.A. Aryne,
Deputy Chief Engineer,
Project Planning Organization,
WASID, WAPDA, 6-P,
Gulberg II, Lahore.

47. Dr. S.M. Zaman,
Deputy Educational Adviser,
Ministry of Education,
Islamabad.

48. Mr. M. Waliullah Khan,
Director Conservation,
Auqaf Department,
Lahore.

49. Mr. Fazal Qadir, T.I.,
419, Peshawar Road,
Rawalpindi.

50. Mr. M. A. Shakoor,
Former Director,
Peshawar Museum,
Peshawar.

51. Mr. S. A. Rashid,
Supdt. Engineer,
Nara Canal Circle,
Hyderabad.

52. Ch. Mohd. Ali,
Principal Research Officer,
(Hydraulics),
Irrigation Research Institute,
Lahore.

53. Mr. Farid Khan,
Department of Archaeology,
Peshawar University,
Peshawar.

54. Mr. M. Ishtiaq Khan,
Superintendent of Archaeology,
Western Pakistan Circle,
Lahore.

55. Mr. Ahmed Nabi Khan,
Superintendent, Exploration Branch,
Department of Archaeology,
Karachi.

56. Ch. Rahmatullah,
Archaeological Chemist,
Central Archaeological Laboratory,
Old Fort, Lahore.

57. Sh. Khurshid Hasan,
Assistant Director (Admn.),
Directorate of Archaeology,
Karachi.

58. Mr. S.M. Ashfaque,
Assistant Superintendent of Archaeology,
National Museum of Pakistan,
Karachi.

59. Dr. M. R. Mughal,
Assistant Superintendent of Archaeology,
Exploration Branch, Department of
Archaeology, Karachi.

60. Mr. Taswir Hussain Hamidi,
Assistant Superintendent of Archaeology,
Sub-Regional Office, Fort,
Hyderabad.

61. Mr. Muhammad Sharif,
Assistant Superintendent of Archaeology,
Western Pakistan Circle,
Lahore.

62. Mr. Niaz Rasool,
Assistant Superintendent of Archaeology,
Sub-Regional Office, Department of
Archaeology, Peshawar.

63. Mrs. P.T. Nasir,
Assistant Superintendent (Numismatics),
National Museum of Pakistan,
Karachi.

64. Mr. M.M. Baig,
Librarian,
Central Archaeological Library,
Karachi.



*N.B.—Were not able to participate.

APPENDIX B

Programme of the Symposium

Delegates arrive from abroad and stay at Hotel Intercontinental, Karachi.

February 22, 1973
Thursday

11:00 a.m. Delegates visit National Museum of Pakistan.
4:30 p.m. Delegates visit Mazar of Quaid-i-Azam.
5:30 p.m. Reception by United Bank Ltd.
8:00 p.m. Dinner at Hotel Intercontinental.

February 23, 1973
Friday

8:30 a.m. Depart Karachi by P.I.A. (Flight Pk-572).
9:30 a.m. Arrive Moenjodaro.
11:00 a.m. Inauguration of the International Symposium by the President of Pakistan.
11:45 a.m. Visit to the Museum and Book Exhibition.
12:30 p.m. Lunch by Mr. Wahid Bakhsh Bughio, M.P.A.
3:30 p.m. Visit to the Archaeological Remains.
5:30 p.m. Tea.
6:30 p.m. Folk performance by Mehran Art Council.
8:00 p.m. Dinner by the Government of Sind.
9:30 p.m. Film on Moenjodaro by courtesy of Pakistan Television.

February 24, 1973
Saturday

10:00 a.m. to 12:30 p.m. First Session of the Symposium—Reading of the Pilot Paper.
1:00 p.m. Lunch.
3:00 p.m. to 5:00 p.m. Second Session of the Symposium—Discussion on the Pilot Paper.
5:05 p.m. Reception in honour of the delegates given by the President of Pakistan.
5:30 p.m. Visit to the Archaeological Remains.
8:00 p.m. Dinner by the Minister for Education and Culture, Government of Pakistan.

February 25, 1973
Sunday

10:00 a.m. to 12:30 p.m. Third Session of the Symposium—Presentation of Master Plan for the Preservation of Moenjodaro.
1:00 p.m. Lunch.
4:00 p.m. Foreign Delegates depart from Moenjodaro by Special Flight.
5:30 p.m. Arrive at Lahore Air Port.
5:45 p.m. Received by the Minister for Education, Government of the Punjab.
6:00 p.m. Arrive at Hotel Intercontinental.
7:30 p.m. Cocktail Party.
8:00 p.m. Dinner at Hotel Intercontinental.
9:30 p.m. Visit to the Shalimar Gardens.

February 26, 1973
Monday

8:45 a.m. Leave Hotel Intercontinental for Lahore Museum.
9:00 a.m. Visit to the Lahore Museum.
10:00 a.m. Leave Museum for Badshahi Mosque.
10:15 a.m. Visit to the Badshahi Mosque.
10:35 a.m. Leave Badshahi Mosque for the Lahore Fort.
10:40 a.m. Visit to the Lahore Fort.
11:20 a.m. Leave Lahore Fort for Hotel Intercontinental.

1:00 p.m. Lunch given by the Government of the Punjab at Hotel Intercontinental.

2:30 p.m. Leave Hotel Intercontinental for Lahore Air Port.

3:00 p.m. Foreign Delegates depart for Rawalpindi by Pk-304.

4:45 p.m. Foreign Delegates arrive at Rawalpindi/Islamabad and stay at Hotel Intercontinental.

8:00 p.m. Dinner at Hotel Intercontinental.

February 27, 1973
Tuesday

9:00 a.m. Meeting with the Minister for Education and Culture, Government of Pakistan.

10:00 a.m. to 12:30 p.m. Sight-seeing at Islamabad.

1:00 p.m. Lunch given by the Minister for Education and Culture, Government of Pakistan.

3:00 p.m. to 6:00 p.m. Visit to Taxila followed by Tea Reception given by the Pakistan Tourism Development Corporation.

8:00 p.m. Dinner.

February 28, 1973
Wednesday

6:00 a.m. Depart from Rawalpindi by Pk-600.

6:40 a.m. Arrive at Peshawar.

7:30 a.m. Breakfast at Dean's Hotel.

9:00 a.m. Visit Khyber Pass.

1:00 p.m. Lunch at Khyber Rifles, Landi-Kotal given by the Government of N.W.F.P.

4:00 p.m. Visit to Museum.

7:05 p.m. Depart from Peshawar by Pk-635/307.

11:00 p.m. Arrive at Karachi and stay at Hotel Intercontinental.

March 1, 1973
Thursday Foreign Delegates leave for their respective destinations.

APPENDIX C

Symposium Committee

CHAIRMAN:

Mr. Justice Feroze Nana Ghulamally,
Former Judge of the High Court of
West Pakistan.

VICE-CHAIRMAN:

Mr. B.A. Kureshi,
Former Chief Secretary to the Government of
West Pakistan.

MEMBERS:

1) Mr. Wahid Baksh Bughio, M.P.A.

2) Miss Taj Bibi Baluch, M.P.A.

3) Mr. Inayatullah,
Secretary to the Government of Pakistan,
Ministry of Minorities Affairs & Tourism.

4) Mr. S.A. Naqvi,
Director of Archaeology and Museums,
Government of Pakistan.

5) Dr. N.A. Baloch,
Director, Institute of Education and
Research, University of Sind,
Hyderabad.

6) Dr. A.H. Dani,
Dean, Faculty of Social Sciences,
University of Islamabad.

7) Mr. Abdul Wahab Sheikh,
Deputy Commissioner, Larkana.

8) Dr. S.M. Zaman,
Deputy Educational Adviser,
Ministry of Education,
Government of Pakistan.

9) Mr. Muhammad Ishtiaq Khan,
Superintendent of Archaeology,
West Pakistan Circle,
Lahore.

SECRETARY:

Mr. Taswir Husain Hamidi,
Assistant Superintendent of Archaeology,
Sub-Regional Office, Hyderabad.

APPENDIX D

Symposium Organizing Committees

Director incharge:
Mr. S. A. Naqvi,
Director of Archaeology & Museums,
Government of Pakistan, Karachi.

Sub-Committee I: *General Arrangements at Moenjodaro*:

Officer in Charge:
Mr. Muhammad Ishtiaq Khan,
Superintendent of Archaeology,
West Pakistan Circle, Lahore.

Assisted by:
1) Mr. Taswir Hussain Hamidi
2) Mr. M. M. Baig
3) Mr. Afzal Ahmad
4) Mian Said Qamar

Sub-Committee II:
Proceedings of the Symposium and Information Desk at Moenjodaro.

Officer in Charge:
Mr. Ahmad Nabi Khan,
Superintendent of Archaeology,
Explorations and Excavations.

Assisted by:
1) Dr. M.R. Mughal
2) Mr. M.A. Halim
3) Miss Salma Sultana

Sub-Committee III: Co-ordination, Hotel and travel arrangements:

Officer in Charge:
Mr. Khurshid Hasan,
Assistant Director (Administration),
Department of Archaeology & Museums,
Karachi.

Assisted by:
1) Mr. M.M. Baig
2) Mr. Mohd. Nazir Khan
3) Mian Abdul Majeed

Sub-Committee IV: Publications and Advance Publicity:

Officer in Charge:
Mr. S.M. Ashfaque
Assistant Superintendent of Archaeology
National Museum of Pakistan,
Karachi.

Assisted by:
Mr. Hidayatullah Siddiqui.

Sub-Committee V: *Accounts*:

Officer in Charge:
Mr. Taswir Hussain Hamidi,
Assistant Superintendent of Archaeology,
Sub-Regional Office, Hyderabad.

Assisted by:
Mian Said Qamar

Sub-Committee VI: *Transport*:

Officer in Charge:
Mr. Niaz Rasool,
Assistant Superintendent of Archaeology,
National Museum of Pakistan,
Karachi.

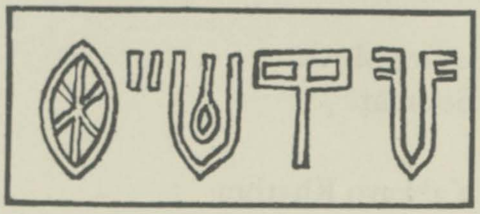
Sub-Committee VII: Arrangements for Lady guests:

Officer in Charge:
Mrs. Pervin Nasir,
Assistant Superintendent (Numismatics),
National Museum of Pakistan,
Karachi.

Officer in Charge of arrangements at:
Lahore: Mr. Mohammad Sharif
Taxila: Mr. I.H. Nadiem
Peshawar: Mr. Inayat-ur-Rahman
Mr. F.D. Masud

Assistants:

1. Mr. Qamaruddin
2. Mr. S. B. H. Kazmi
3. Mr. Karim Bux
4. Mr. Mohammad Haneef
5. Mr. Haji Mohammad
6. Mr. Mohammad Tahseen
7. Mr. Mohammad Siddiq
8. Mr. Shah Mohammad
9. Mr. Syed Mohammad
10. Mr. Salim Ahmad Khan
11. Mrs. R.A. Jatoi
12. Miss Salma Sultana
13. Mr. Afsar Ali Khan
14. Mr. Mohammad Rauf Khan
15. Mr. Fida Hussain Qureshi
16. Mr. S. A. Siddiqi
17. Mr. Sagir Mirza
18. Mr. Nusrat Baig
19. Mr. Mohan Lal
20. Mr. Fazal Din
21. Mr. Abdul Hamid
22. Mr. Abdul Naeem
23. Mr. Faiz Mohammad
24. Mr. M. Siddiq
25. Mr. Kamaluddin
26. Mr. Shakur Mohammad
27. Mr. Mohammad Hussain
28. Mr. Mohammad Hadees
29. Mr. Ghulam Subhani
30. Mr. Talmiz Hussain



APPENDIX E

Folk Music of Sind

Programme

1. DASS, the Traditional Duhl-and-Sharnai Orchestra
   Opening by Muhammad Akram Manganhar and Party Demonstration of 'Chhambh beat' by Allah Bakhsh Manganhar and Party.

2. BORINDO AND DILO:
   (a) Borindo: tunes by Jan Mohammad Jatt.
   (b) Dilo Beats: Tin Tar Beat by Ali Muhammad; Mughli Beat by Ahmad; Kalwaro Beat by Mitho Khan.

3. DILO NAACH: The Traditional Water-Jar-Dance,
   Performance by Suleman of Thatta.

4. SHAH-JO-RAAG: A Chapter from the Music Institution of Shah Abdul Latif Mode Desi: by Faqir Allah Jorio and associates to the accompaniment of the five-stringed Danboro.

5. KAFI SONG: In the Sufi Kalam Style:
   Chorus by Abdul Ghafoor, Yar Muhammad, Dhol and Husain Bakhsh.

6. SURANDO: Lahra Music
   Laung Soomar.

7. TALYOON: Kalwaro Rhythm
   Muhammad Ismail Hingoro.

8. WAEE, a devotional Solo Song:
   Alan Faqir Manganhar.

9. MORO: Folksong of Chhapar (the Western Hilly Region)
   Talib Palari, Pir Bakhsh and Ali Muhammad.

10. NADDU: the Reed Instrument: Tune Bhairavi
Mir Muhammad Baloch.

11. CHAPAROON: (Wooden Flints); A demonstration in rhythmic beats
Rano, Chandi & others.

12. THAREE: Folksong of the Eastern Tharparkar Area
Mai Bhagi of Mithi.

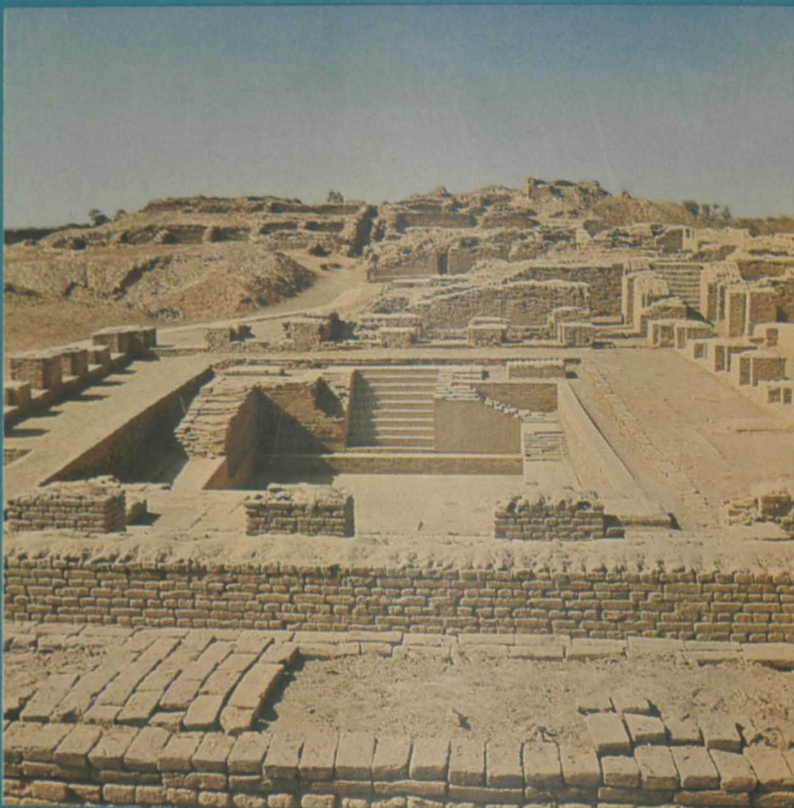
13. BEENU: Double-Pipe: Tune Tilang
Khamisokhan.

14. BANSIREE: the Flute: Tune Dastan
Ali Muhammad.

15. BEENU: the Double-Pipe Tune Rano
Misrikhan Jamali, to the accompaniment of Dilo by Mithokhan.

16. MURLEE: Tune Sorath
Iqbal & Partner.

HO-JAMALO: Folk Dance by the Participants.



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